

CLINICAL THERAPEUTICS

- I. THERAPEUTIC AGENTS*
- II. THERAPEUTIC PROCEDURES*
- III. THE TREATMENT OF SYMPTOMS*
- IV. THE TREATMENT OF DISEASES*

BY

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PARIS, FRANCE

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SECOND EDITION

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REVISED AND ENLARGED FRENCH EDITION*

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VOLUME II

TREATMENT OF SYMPTOMS AND DISEASES



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CLINICAL THERAPEUTICS.

VOLUME II.

PART III. TREATMENT OF SYMPTOMS.

PART IV. TREATMENT OF DISEASES.

PART III.

TREATMENT OF SYMPTOMS.

The practice of medicine not infrequently involves the treatment of symptoms.

The practitioner is called upon to treat a patient who complains of cough and expectoration, of fever, of loss of weight, of shortness of breath, of lassitude, of tinnitus, of palpitations, of inability to sleep, etc.

It is unnecessary to dwell herein upon the deplorable consequences of "equation therapeutics," which consists in establishing a strict, unwarranted relationship between a symptom, which may be due to a number of different causes, and a single plan of treatment—an unfortunate consequence of unthinking overextension of the really restricted practice of specific treatment, which applies only to a very limited number of specifically determined morbid entities.

On the other hand, symptomatic medication becomes an excellent practical training for the physician who will force himself logically to seek out the proximate or remote, direct or indirect, simple or complex cause of the presenting symptom and combat it. That this inquiry still is often disappointing, that the treatment of the symptom still is very frequently founded on pure empiricism, is unfortunately only too true. I hope to be able to show, however, that the approximation is often a very close one and that pathogenetic theory and therapeutic practice are closely interrelated.

It is in this feature—therapeutic action—that the present work is an especial counterpart of the earlier work entitled "Clinical Diagnosis," in which the particular object sought is an understanding of clinical conditions from the standpoint of pathologic physiology. In our minds these two aspects of the matter are mutually complementary.

AËROPHAGIA.

By LÉON MEUNIER, M.D.

All of us are in some degree aërophagic. Normally, after a meal, the stomach contains a certain amount of air forming a cushion of gas against which the stomach musculature braces itself in churning and expelling the gastric contents. This cushion of gas is supplied by the esophagus, acting as a pump; the boluses of saliva constitute so many plungers which carry down with them the air layers required for the inflation of the gastric air-sac.

Accordingly, whenever the evacuation of the stomach is compromised for some reason or another (weak musculature, gastropnoia, conditions of spasm), the subject attempts to make up for his insufficiency of evacuation by increasing his intragastric pressure through an extra stroke of the pump.

Unfortunately, in the ill person, the nervous subject, lack of moderation in these pump-strokes is the rule: This results in pathologic aërophagia.

* * *

The proper treatment for aërophagia does not consist, therefore, in trying to overcome the swallowing of saliva which is carrying the air down into the gastric cavity, as by placing a cork between the teeth, compression of the larynx, pinching the nostrils together, etc.; the object should exclusively be to overcome the condition of poor gastric evacuation which is bringing about the aërophagia as a defensive measure.

Following are the measures which I recommend:

A. **During the period of gastric distention.**—1. *Application of heat over the region of the stomach*, which, by supplying calories to the stomach wall, favors the contractions of this organ. For this purpose, the portable heating devices of the type of the Japanese stove, so designed as not to interfere with active life, may be used.

2. Ingestion of a dilute medicinal solution which will cause little change in the chemical composition of the gastric contents, but will restore its molecular concentration to the optimal concentration for evacuation of the stomach ($\Delta=0.38$).

Thus, the following powder may be used:

℞ Sodii bicarbonatis	15 grams (gr. ccxxxj);
Sodii citratis	8 grams (gr. cxxiiij);
Lactosi	177 grams (℥xlvss).—M.

Of this powder one teaspoonful is to be taken in a demi-tasse of very hot water when the sensation of flatulence comes on, and repeated as many times as is necessary.

3. When the attacks come on, the patient should take, in repeated swallows, some carbonated liquid such as Seltzer water or Rivière's solution (see *Alkalies*).

In this manner there is produced a carbon dioxide *aërophagia* or *therapeutic aërophagia* which is suddenly superimposed upon the *natural aërophagia* and sometimes brings about an immediate cessation of the pain.

4. In the severe cases (spasm superimposed upon duodenopyloric stenosis), the stomach should be emptied with the stomach tube.

B. **In the intervals between attacks.**—Overcome the muscular insufficiency of the parietes and stomach by means of massage, active movements, and a suitable belt.

Combat the spasm of the cardial and pyloric orifices by dilatation of these orifices with Einhorn's pneumatic dilator.

Combat the general nervous factor by psychotherapy.

ALBUMINURIA. [Albumen, *white of egg*; οἰπεῖν, *to urinate*.]
Presence of albumin in the urine.

TREATMENT OF THE SIMPLE CHRONIC ALBUMINURIAS.

The general features of the treatment of **albuminuria** as presented herein are those recognized by Castaigne.

After one has made certain that a true albuminuria is present and has excluded both the acute cases requiring treatment of the causative febrile disorders and the cases accompanied by cardiorenal disturbances (states of retention, renal impermeability, high blood-pressure and cardiac disorders) and requiring the general treatment for azotemic, chloridemic and hydremic (hypertensive) nephritis, there remains, in the last analysis, a group, still rather compact, of the "**BENIGN CHRONIC ALBUMINURIAS**" (Castaigne)—the only forms to be dealt with in this section.

Some evidences are common to all cases of simple chronic albuminuria; others are more special and relate to the condition of the digestive canal, the liver, cell metabolism, and the general state of good health or debility of the patient.

THE DIET.—If to Graves belongs the great credit of having fed fever cases, to Castaigne will belong that of having fed the cases of albuminuria and of having shown beyond the possibility of doubt that restricted diets, and more especially the exclusive milk diet, are extremely harmful to these patients, and that a given case of simple albuminuria brought down to a state of cachexia by such diets was often restored to a relatively satisfactory state of health as a result of being allowed a liberal diet and even, sometimes, showed a reduction in the albuminuria synchronous with this change in the treatment.

As Gouget so soundly observed in a general review entitled "**Diet in Nephritis**," which, I regret, cannot here be reproduced *in extenso*: "Like uremia, anemia is a pitfall to be avoided, and one should not plunge into the one difficulty with the object of escaping from the other," and further on he says: "One should not, as there is too often a tendency to do, place at the two extremes of diet in nephritis the milk diet, to be regarded as the most favorable, and the meat diet, to be regarded as the most harmful, with the vegetable diet, as it were,

intermediate in value between these two. Milk has its contraindications, and meats may have their advantages."

Adjustment of the treatment to the individual case is, therefore, in order:

In a general way, in these cases, after a careful study of the problem, one should order an ordinary mixed diet with a sufficiency of nitrogenous food (120 to 130 grams of red meats, broiled or roasted, or fowl or fish, one or two eggs, $\frac{1}{4}$ to $\frac{1}{2}$ liter of milk), complemented with vegetables, pastes (macaroni, noodles, etc.), fruits, fresh or cooked cheese, biscuits, 120 to 180 grams of bread, and possibly a little wine. It is well, however, to forbid pork products (except smoked ham), sauces, game, shell-fish, and fish the freshness of which is not positively known.

Special Indications in Sickly, Weak Cases of Albuminuria recalling in a measure the tuberculous aspect.—It is in these cases in particular that the diet should be substantial and contain plenty of nitrogen; even raw meat is frequently indicated.

Open air and sunlight treatment, breathing exercises, general frictions and hot douches are to be ordered.

Tonic and reconstituent medication: Tannic acid, calcium phosphate and carbonate, cinchona and iodotannic preparations.

Special Indications in Full-blooded Cases of Albuminuria of the neuro-arthritic type: Patients with plethora, gout, migraine, or hemorrhoids.—Here it is the uricemia rather than the albuminuria which must be antagonized.

Diet principally low in meats, consisting mainly of milk, vegetables and fruit.

Open air treatment and physical training: Frictions, exercise in the open air, calisthenic exercises, walking, sports in moderation (croquet, golf, tennis and bicycle-riding in moderation).

Alkaline and uricolytic medication (the latter to be closely watched).

Special Indications Relating to the State of the Digestive Functions, of the type of lowered gastro-intestinal functioning with dilatation, stasis, hyperchlorhydria and hypopepsia:

Diet worked out by trial, according to digestive tolerance and the amount of albumin in the urine. Here it is well to discard all preconceived notions and to order after a period of groping either a mixed diet including meats or predominantly vegetarian, or even a milk diet, if this seems to be the best digested and to produce the least albumin. The only general instructions *a priori* are: To eat slowly, chew for a long time,

cut the meat into very small pieces, reduce the vegetables to purées, drink little during the meals and lie down afterwards.

Digestive medication.—1. Animal gastric juice, pepsin, trypsin, pancreatin (the latter in suitably coated capsules to prevent dissolution in the stomach).

2. Massage, electricity, and lavage of the stomach.

3. One half-hour before meals, a wineglassful of warm Vichy water (Grande-Grille) to which has been added 15 to 30 drops of tincture of nux vomica.

Special Indications Relating to the Liver, in cases of the pallid obese type with enlarged liver and spleen following overeating.

FIRST STAGE OF THE TREATMENT:

Absolute rest in bed with hot applications over the hepatic region.

An exclusive milk diet: "Two liters of skimmed milk and one liter of water containing a little lactose to be taken through the day in small swallows every five minutes, so regulated that the ingestion of these fluids, begun at 8 a. m., shall terminate only at 10 p. m."

SECOND STAGE OF THE TREATMENT:

Exercise in moderation.

Diet including a certain amount of meat as soon as the liver has returned practically to normal.

Stimulant medication to the liver cells, as by iron salts, sodium bicarbonate, Vichy water and organotherapeutic liver preparations.

Vichy or Pougues as watering resorts.

Indications Relating to the Kidneys.—Direct administration of renal substance is a "useful adjunct measure to complete the results obtained with other measures."

Renal organotherapy (dried extracts or J. Teissier's renal serum therapy).

Calcium chloride: 0.5 to 2 grams ($7\frac{1}{2}$ to 30 grains) a day, divided into two to four doses, prescribed in syrup of bitter orange-peel.

Strontium tartrate: 2 to 4 grams (30 to 60 grains), divided into four doses, taken with the meals, in syrup.

A watering-resort available in these cases is *Saint-Nectaire*, which is deemed to act both through direct stimulation of nitrogen metabolism and through "stimulation and repair of the renal epithelia as a result of the active hyperemia of the tubules brought on by the treatment."

MINERAL WATERS IN ALBUMINURIA.*

Simple Albuminuria. Renal Debility. Cryptogenic Albuminuria.

(a) Inherited nutritive defect, anemia, lymphatic constitution: Sodium chloride waters: Salies, Saline-Moutiers, Salins-du-Jura, Biarritz, Briscous.—Arsenical waters: La Bourboule.—Sodium chloride waters with iron and arsenic: Saint-Nectaire.

(b) Orthostatic, hyposphyxic albuminurias: The preceding resorts and Royat.

(c) Obese cases: Brides.

(d) Residuum of an acute infectious nephritis: Saint-Nectaire.

(e) Anemic, dyspeptic cases: Pougues.

Chronic Nephritis.

(a) With mild renal insufficiency, without chloride retention: Saint-Nectaire.

(b) With urinary evidences (low output, high specific gravity, etc.), but renal permeability not exhausted: Evian, Vittel, Martigny, Contrexéville.

(c) With predominance of the cardiovascular disturbances (type condition: interstitial nephritis), but without exhaustion of cardio-renal reserve power: Royat.

All treatment at watering places is contraindicated in the presence of advanced nitrogen retention, of chloride retention with edema which is difficult to reduce, of cardiorenal insufficiency which has reached the stage of lost compensation with permanently poor heart-action, or of nephritic cachexia.

*[The author in this table refers mainly to an actual course of treatment at the French watering-places referred to. While exactly similar facilities for at least some of these courses of treatment are not likely to be found in this country, and less stress is here laid on this kind of treatment, the table was deemed of sufficient interest to be included in the American edition. American mineral waters similar to some of the French waters will be found in the section on *Crenotherapy*. Particular care should be taken to avoid waters containing chlorides in any but the incipient cases of chronic nephritis. The table, it seems, had best be taken as applying to the simple albuminurias rather than to definite cases of nephritis.—TR.]

ALOPECIA (COMPLETE OR PARTIAL LOSS OF THE HAIRY APPENDAGES.)

[Lat. alopecia;
from the Greek ἡ ἀλωπηξία,
derived from ἡ ἀλώπηξ,
the fox.]

INCURABLE FORMS OF ALOPECIA.—It will readily be understood that the *cicatricial alopecias* are quite incurable, the hair follicles having been destroyed. The same almost applies to the true *congenital alopecias*, the result of an inborn defect in the nutrition of the follicles, against which treatment is practically powerless. As a makeshift, general tonic medication, of which these patients are always in need, as by arsenic, iodotannic preparations, cinchona and organotherapy, may be prescribed, together with a stimulating lotion of the following type:

℞ Aquæ ammoniæ 3 c.c. (℥xliv);
Olei terebinthinæ 8 c.c. (f3ij);
Tincturæ aromaticæ (N.F.),
Tincturæ pyrethri,
Tincturæ capsici āā 60 c.c. (f3ij).

Sig.: For external use.

FORMS OF ALOPECIA THE PROGRESS OF WHICH CAN BE RETARDED.—Almost the same is true, unfortunately, of *idiopathic premature alopecia* and *senile alopecia*, which run an identical course (beginning at the vertex, with gradual centripetal extension and final “billiard ball” condition or “Hippocratic baldness”) and, from the pathologic standpoint, end in atrophy of the hair-follicles.

By persistent, active and careful treatment the morbid process can, however, be slowed down.

The **general treatment** consists in correcting any existing shortcomings in the mode of life and general health of the patient. All unwholesome dietetic practices should, in particular, be eliminated, and likewise overwork and an unduly sedentary mode of life. In women, affections of the reproductive organs should be carefully treated. The nervous system should be quieted down, if need be. Sometimes arsenic seems indicated.

The **local treatment** should be adapted to the lesions locally present:

IF LESIONS OF PITYRIASIS EXIST:

(a) The scalp should be washed daily with tar soap, soap containing oil of cade, or a sulphur soap.

(b) *At night, yellow oxide of mercury ointment* should be applied, or:

R. Hydrargyri oxidi flavi	0.5 gram	(gr. viiss);
Olei theobromatis	5 grams	(gr. lxxv);
Olei amygdalæ dulcis	16 c.c.	(3ss).

M. Sig.: For external use.

IF SEBORRHEIC LESIONS ARE PRESENT:

(a) Wash with a liquid sulphur soap.

(b) *Apply in the morning* the following lotion:

R. Resorcinolis	0.3 gram	(gr. v);
Saponis mollis	0.5 gram	(gr. viiss);
Olei picis rectificati	4 c.c.	(f3j);
Potassæ sulphuratæ	4 grams	(3j);
Aquæ coloniensis	100 c.c.	(f3iiiss).—M.
		(VEYRIÈRES.)

(c) *Apply at night* the following ointment:

R. Acidi salicylici	1 gram	(gr. xv);
Olei cadini,		
Balsami peruviani	āā 10 c.c.	(f3iiiss);
Adipis lanæ hydrosi	30 grams	(3j).—M.
		(FOUQUET.)

IF HYPERIDROSIS EXISTS:

(a) Apply a stimulating *lotion* of the following type:

R. Balsami peruviani	5 c.c.	(m lxxx);
Sulphuris sublimati	10 grams	(3iiss);
Olei terebinthinæ rectificati	6 c.c.	(f3iiss);
Tincturæ aromaticæ	50 c.c.	(f3xij).

M. Sig.: For external use.

(b) Then *dust over* with some *bland or alkaline powder*, such as talcum powder or magnesium carbonate.

IF THERE IS NO LOCAL LESION:

(a) Apply a stimulating *lotion* of the following type:

R. Pilocarpinæ hydrochloridi	0.5 gram	(gr. viiss);
Quininæ hydrochloridi	1 gram	(gr. xv);
Acidi acetic,		
Tincturæ cantharidis	2 c.c.	(f3ss);
Spiritus camphoræ	100 c.c.	(f3iiiss);
Aquæ	200 c.c.	(f3vij).—M.
		(FOUQUET.)

(b) Apply the following *ointment*:

R. Quininæ hydrochloridi,		
Pilocarpinæ hydrochloridi	āā 0.35 gram	(gr. vss);
Sulphuris præcipitati	2 grams	(3ss);
Petrolati	20 grams	(3v);
Tincturæ benzoini	q. s.	—M.
		(BROcq.)

When baldness is established, persistent, energetic and prolonged treatment may result in the growth of a few sound but sparse hairs, but "the result is hardly satisfying from the cosmetic standpoint" (Darier.)

FORMS OF ALOPECIA FROM WHICH RECOVERY ALWAYS TAKES PLACE.—Infectious and Post-infectious Forms (typhoid fever, erysipelas, pneumonia, influenza, the eruptive fevers, etc.).—Varying in intensity and extent, the post-infectious form of alopecia is always recovered from. Some stimulating lotion such as Cologne water or one of the stimulating preparations already mentioned will suffice in the treatment.

If *pityriasis* is present, it should be treated as already described.

Is there any object in cutting the hair which remains? This is a widespread and generally recommended practice. Darier, however, deems it useless.

Syphilitic Form.—This is manifested sometimes in a general reduction of the amount of hair; at other times in a practically pathognomonic appearance of bald patches. Regrowth of the hair both on the scalp and elsewhere (eyebrows, beard, mustache and body hairs) is constant. "Syphilis does not make people bald." (A. Fournier.)

The specific treatment is all-sufficient, though some stimulating lotion and the yellow oxide ointment formulated above may also be prescribed.

FORMS OF ALOPECIA FROM WHICH RECOVERY OCCURS SOMETIMES.—The alopecia of chronic diseases, such as anemia, diabetes, cancer, tuberculosis, exophthalmic goiter, the leukemias, utero-ovarian diseases, etc., and of *certain chronic intoxications*, as by alcohol, lead, etc., leads to clinical appearances very similar to the infectious form of alopecia above alluded to. Being, however, dependent upon a chronic cause, they are themselves chronic, diffuse, and progressive, stationary or retrogressive along with the disorder to which they are due. Obviously, it is this underlying cause which must be treated.

One may in addition, however, prescribe a *stimulating lotion*:

R. Tincturæ pilocarpī,
Tincturæ cantharidisāā 25 c.c. (f3vj);
Linimenti saponis 100 c.c. (f3iij).

M. Sig.: Use as a lotion.

(FOUQUET.)

and the following *oil* preparation:

R	Tincturæ pilocarpī,			
	Tincturæ rosmarini	āā	10	c.c. (f3iiss);
	Quininae		4.25	grams (gr. viiss);
	Alcoholis diluti		10	c.c. (f3iiss);
	Olei ricini		20	c.c. (f3v).

M. Sig.: For application to the hair.

(FOUQUET.)

FORMS OF ALOPECIA CURABLE IF CAREFULLY TREATED.—Alopecia areata and the different forms of ringworm belong in this group.

Alopecia Areata.—As little is known concerning a rational treatment of this condition as concerning its pathogenesis. Its precise nature is as yet unknown, if, indeed, it constitutes a single disorder. The parasitic and infectious conception of the disease has seen its day. Jacquet's dystrophic and reflex theory harmonizes with many known facts, but does not account for them all. The tendency to alopecia areata seems to be constitutional, inherited and familial in some cases; in others the condition has seemed attributable to disturbed thyroid function. In short, there are a few special truths relating to it, but no general rule—only a few scanty beams of light in the general obscurity. Many practical rules may, however, be based on the little that is known.

1. **USELESSNESS OF THE FORMER PROPHYLAXIS AGAINST INFECTION.**—Uselessness of isolating these cases, having them wear prophylactic headgear, etc. Rehabilitation of the innocent barbers and harmless hats, etc.

2. **UTILITY OF GENERAL TREATMENT** adapted to the individual abnormalities of the patient, including efforts to overcome poor nervous balance and trophic deficiencies through proper general hygiene and appropriate medication. The following measures are in order, according to the case:

- (a) Life in the open, at the seaside, in the country, in the mountains.
- (b) Hydrotherapy suited to the case (stimulant or sedative).
- (c) Kinesitherapy in all its forms (gymnastic exercises, games and sports).
- (d) Organotherapy, chiefly thyroid.
- (e) Other drugs: Arsenic, phosphates, quinine, etc.

3. **NEED OF INVESTIGATING AND TREATING ANY POSSIBLE LOCALIZING CAUSES WHICH ARE THE STARTING-POINT OF THE REFLEX STIMULI LEADING TO THE DISTURBANCE OF HAIR NUTRITION.**

- (a) Teeth to be treated, tonsils and adenoids removed, etc.
- (b) Digestive tract to be watched and treated.

4. LOCAL TREATMENT OF THE SCALP:

(a) *Hair to be kept short.*(b) *Stimulating local rubs every day.*

The stimulating lotions used in the Hôpital Saint-Louis, Paris, are made up in three strengths:

	No. 1	No. 2	No. 3
Mercury bichloride			6 grams (3iiss);
Ammonia water ..	4 c.c. (3j)	5 c.c. (℥ lxxx)	100 c.c. (f3iij);
Oil of turpentine ..	10 c.c. (3iiss)	25 c.c. (f3vj)	80 c.c. (f3iiss);
Spirit of camphor	100 c.c. (f3iij)	100 c.c. (f3iij)	420 c.c. (f3xiv).

Following are a few other formulas, subject to various modifications when desired:

- (1) R̄ Acidi acetici,
 Liquoris formaldehydi āā 2 c.c. (f3ss);
 Olei ricini 1 c.c. (℥ xv);
 Tincturæ cantharidis 5 c.c. (℥ lxxv);
 Spiritus lavandulæ 25 c.c. (f3vj);
 Alcoholis 100 c.c. (f3iij).—M.
 Intermediate in strength. (FOUQUET).

- (2) R̄ Chloralis hydratis 5 grams (gr. lxxv);
 Ætheris,
 Acidi acetici āā 105 c.c. (f3iiss).
 Strong.

- (3) R̄ Phenolis,
 Chloralis hydratis āā 10 grams (3iiss);
 Tincturæ iodi (10 per cent.) 10 c.c. (f3iiss).
 Very strong.—To be used only with caution, and reserved for refractory cases.

Great care is necessary to avoid burns and dermatitis in the use of these stimulating lotions.

Subsequently a 1:10 sulphur ointment might be applied.

The following ointment may be recommended:

- R̄ Pyrogallolis,
 Hydrargyri subsulphatis flavi (N.F. III) .. āā 1 gram (gr. xv);
 Olei cadini 10 c.c. (f3iiss);
 Resorcinolis,
 Adipis lanæ hydrosi āā 20 grams (3v).—M.

(c) Treatment of the affected areas with the *spark discharge* of high frequency currents may be substituted with advantage for the above stimulating preparations.

Alopecia due to Ringworm.—TINEA FAVOSA is to be treated by persistent depilation after removal of the crusts, previously softened by emollient applications, with the curet. *X-ray treatment* greatly facilitates this depilation, which it renders painless and changes into more of a

wholesale procedure. A single complete depilation may be sufficient; a second one, if made necessary by recurrence, would be carried out at the end of a month.

Ringworm in its commoner forms is now being treated quickly and effectually with the *X-rays*.

The dosage of the rays, however, requires delicate adjustment and consequently the services of a radiologist. This form of treatment has been thoroughly worked out by Sabouraud. Properly applied, it disinfects the scalp in one month and insures complete restoration of the hair in five months.

If the X-rays are unavailable, the older treatments, which take a much longer time (one year or more) and are sometimes ineffective, should be instituted. They consist essentially in:

- (a) Depilation of the patches and a zone around their margins.
- (b) Daily application of diluted tincture of iodine to the scalp:

R. Tincturæ iodi (10 per cent.) 10 c.c. (f3iiss);
 Alcoholis (60 per cent.) 40 c.c. (f3x).

M. Sig.: For external use.

(c) As a last resort, with great caution and reduction of the resulting curative folliculitis by means of emollient applications, bimonthly applications of croton oil.

As a matter of fact, almost anything may happen in the tinea. Some cases get well of themselves or merely with the assistance of purely hygienic influences; others are almost wholly refractory to all treatments except the X-rays.

ANEMIA.

[a, an, from ἀν-, privative; αἷμα, blood.
No blood, little blood, poor blood.]

It may seem ill-advised to classify the treatment of the anemias with the treatment of symptoms; yet, for practical purposes, this subject does belong here. In by far the greater number of cases, if not always, **anemia** is secondary and symptomatic of another affection (see "*Clinical Diagnosis*").

The treatment should, therefore, be above all etiologic, i.e., directed to the cause. It may, consequently, just as well consist of a surgical operation (such as removal of a fibroid giving rise to hemorrhage) as of specific medication (symptomatic anemia of syphilis).

* * *

It should also, **but concurrently**, be **symptomatic, i.e.,** endeavor to *stimulate blood regeneration*. This anti-anemic treatment brings into play all the physical, dietetic, pharmaceutic, cell-forming and hemoglobin-forming agencies.

I. **Open air treatment, sunlight, exercise**, moderate but systematic (especially the training of the respiration), **hydrotherapy** and *hypodermic injections of oxygen* are particularly indicated as general stimulants to the trophic functions and body nutrition.

II. The **diet** should be one low in fats and carbohydrates, but high in proteins. Red meats, broiled or roasted, lean fish, egg yolk, purées of dried vegetables, green vegetables, fresh cheeses, whole wheat bread, and cereal flours should be its chief components.

The following list shows the number of milligrams of iron (mean iron content) contained in 100 grams of a number of common foods:

Spinach	40	Fish	7
Butcher's meats	37	Peas	7
Green cabbage	30	Potatoes	6
Chicory	22	Barley	5
Yolk of egg	19	Rice	4
Lentils	9	Cow's milk	2
Carrots	9	Whole wheat bread	2
White beans	8	White bread	1

It should not be overlooked, furthermore, that all anemic patients are dyspeptics, whether the dyspepsia be primary or secondary, and that the

diet should be adapted to the capacities of the individual. The condition is generally a hyposthenic form of dyspepsia the result of insufficient secretion and motility, which should be treated (see *Dyspepsia*).

III. The **blood-forming drugs** consist mainly of:

Arsenic, which stimulates cell formation, tending to make good the reduced number of cells.

Iron, inorganic and organic, counteracting the hemoglobin reduction.

The *hematopoietic serum of bled animals* may be used as a general regenerator of the red cells. Information concerning the administration of such products has already been given in Part I of this work.

Perhaps it is advisable to mention as auxiliary remedies of moderate importance the oxydasic drugs of the type of *manganese*; *cholesterin* in *hemolytic* states; physiologic salt solution in the event of marked reduction of blood-pressure; *X-ray therapy*, if the lymphatic system is involved, and *bone marrow*, as an adjunct to hematopoietic serum blood-formation.

IV. At the majority of **watering places** claims are made regarding the cure of anemic patients. Most of these resorts do, indeed, afford such cases the benefits of fresh air, a pleasant rest and moderate elevation.

The arsenic and iron waters, however, and secondarily the sulphur and sodium chloride waters, are held especially suitable for chlorotic anemias. (See *Crenotherapy*, Volume I).

* * *

A summary of the forms of treatment to be preferably employed according to the degree of anemia existing in a given case may be given as follows:

Mild anemia: Arsenic compounds, good general hygiene.

More pronounced anemia: Iron and arsenic, good general hygiene.

Severe anemia:

1. Iron and arsenic.
2. Organic products stimulating blood-formation (hemoglobin, fresh horse serum, serum of bled horses in which the blood is being regenerated, fresh bone marrow or, if it is not obtainable, extracts).
3. Very carefully adjusted diet.
4. Climatic treatment (sea or mountains) and crenotherapy (mineral waters).

Severe anemia with hemolysis and a hemorrhagic tendency.

Here the liver is always involved. The resistance of the red blood cells should be tested.

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MINERAL WATER TREATMENT IN THE CHLOROTIC ANEMIAS.

RESORTS.	INDICATIONS.	CONTRAINDICATIONS.
Iron Waters.	Toxic, post-traumatic, post-puerperal and post-infectious anemias. Simple chlorosis. Albuminuria.	Tuberculosis. Nervous exhaustion. Marked dyspepsia. Fever. Heart affections.
Arsenical Waters.	Post-infectious anemias. Anemia in cases of inherited debility and hypophyxic or pretuberculous cases. Anemia the result of overwork, exhaustion.	
Sulphur Waters.	Post-infectious anemias (typhoid fever) and, especially, syphilitic or lead anemias.	
Chloride Waters.	Torpid anemias with demineralization. Bone conditions; lymphatic disorders. Rickets; localized tuberculous conditions.	Congestive tendencies. Nervous erythema. Delicate skin. Sensitive mucous membranes.
Miscellaneous Waters, such as those of the following French resorts: VICHY, ROYAT, POUQUES, CHATEL-GUYON, ÉVIAN, SAINT-NECTAIRE, PLOMBIÈRES.	Dyspeptic forms. Intestinal forms (constipation, enteritis). Chlorotic anemia of Bright's disease.	Fever. Heart affections.

IF RED CELL RESISTANCE IS DIMINISHED:

1. Alternate the arsenical, ferruginous and organotherapeutic measures mentioned above.

2. Combine with them:

(a) Calcium chloride, 4 to 8 grams (1 to 2 drams) a day.

B. Calcii chloridi 8 grams (3ij);
Tincturæ cinnamomi 10 c.c. (f3iiss);
Syrupi aurantii amari 75 c.c. (f3iiss);

M. Sig.: Three tablespoonfuls a day.

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(b) Adrenalin, 20 to 40 *drops* a day.

(c) Methylene blue, 0.2 to 0.3 gram (3 to 5 grains), in pills, cachets or intramuscular injections of 2 c.c. (30 minims) of a 10 per cent. sterilized solution.

IF RED CELL RESISTANCE IS NORMAL OR INCREASED:

1. Test the patient's susceptibility to iron and arsenic, which are sometimes poorly borne, especially when taken by the mouth.

2. Combine with them:

(a) Hepatic organotherapy (glycogen, liver extracts, maceration of fresh pig's liver given by enema).

(b) A preparation of quinine or cinchona.

* * *

As typical plans of treatment for anemia, the following three lists of therapeutic directions are presented:

1. Simple Anemia Due to Overwork and Sedentary Occupation with Insufficient Food.

1. *Live as much as possible in the open air.* Air the living quarters thoroughly and frequently. Sleep with the windows open. Avoid having in the room heating devices burning constantly at a slow rate of combustion.

Walking and regular exercises not pushed to the point of fatigue. Breathing exercises in the open air morning and evening. If possible, sojourn in the mountains or at the seaside during the summer.

Daily hydrotherapeutic measures:

Cold sponge bath followed by dry rub and a walk.

Or a wet pack or complete immersion in cold water in a tub, followed by rubbing until reaction occurs.

Or a cold jet douche for fifteen to twenty seconds.

Or a hot douche for one minute, followed by an extremely short cold jet douche.

Dry rub or alcohol rub.

Drinking of some hot beverage (tea, chocolate or cocoa).

A walk.

2. *Food* to be taken regularly and in substantial amount—though avoiding excess—in accordance with gastric tolerance and individual taste. The taking of red meats, broiled or roasted, fish, eggs, green vegetables, lentils, purées, etc., should, however, be emphasized.

3. *For ten days in each month:*

℞ Ferri protoxalatis 0.1 gram (gr. iss);
Rhei pulveris 0.05 gram (gr. ¼).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: One pill three times daily with the meals.

For the succeeding ten days:

A daily hypodermic injection of 0.1 gram ($1\frac{1}{2}$ grains) of sodium cacodylate.

For the last ten days:

R Hemoglobin 25 grams (3vj);
Syrupi 375 c.c. (f3xiiss).

M. Sig.: One tablespoonful with breakfast and supper.

II. Severe Anemia of the Pernicious Type Following Malaria or Other Infection:

1. Carefully investigate the cause and combat it. If malaria, quinine and arsenic; if syphilis, mercury and the arsphenamins, etc.

2. Absolute rest in the open air, preferably in a warm, dry climate, in a sunny locality.

3. Diet to be carefully watched:

Milk and milk products, fresh cheeses.

Eggs, egg yolks, brains.

Broiled or roasted meats, ground raw meat, meat juice.

Fish.

Vegetable purées.

Cooked fruit, marmalades, compotes.

Cookies.

4. *For ten days in each month:*

(a) Daily hypodermic injection of arrhenal—0.1 to 0.2 gram ($1\frac{1}{2}$ to 3 grains).

(b) Five per cent. hemoglobin syrup; one tablespoonful with each meal.

For the succeeding ten days:

(a) Daily hypodermic injection of 0.06 to 0.09 gram (1 to $1\frac{1}{2}$ grains) of iron cacodylate, obtained from 1-c.c. ampules each containing 0.03 gram ($\frac{1}{2}$ grain).

(b) Adrenalin solution, 1:1000; 20 drops in the morning and afternoon in a little sweetened water.

For the last ten days:

(a) R Calcii chloridi 10 grams (3iiss);
Syrupi aurantii amari 150 c.c. (f3v).

M. Sig.: One tablespoonful with each meal.

(b) Hematopoietic serum from bled horses, 10 to 20 c.c. ($2\frac{1}{2}$ to 5 fluidrams) by mouth, enema or cautious injection (in the latter case, symptoms due to the serum may result).

Spleen and bone marrow organotherapy may be added.

III. Chlorosis with Dyspepsia (anorexia, flatulence, vomiting).

1. and 2., as in the preceding list.
3. Diet to be carefully watched.

The patient should first be placed on an exclusive milk diet for a few days.

Further feeding should be cautiously and gradually resumed, beginning with eggs, boiled fish and white meats.

Before giving any iron it is advisable to improve or eliminate the dyspepsia which all cases of chlorotic anemia exhibit. Forgetting this rule is, perhaps, the commonest cause of failure in iron medication.

4. *A. Chalybèate Medication.*—As has just been stated, the *iron preparations* should be started only after the dyspepsia has improved, and only small doses should be given at first. With these precautions intolerance to iron is seldom noted; the hematoblastic function is rapidly stimulated and the general condition improves. In prescribing iron the following combination may be used:

℞ Ferri protoxalatis 0.15 gram (gr. iiss);
 Rhei pulveris 0.05 gram (gr. $\frac{3}{4}$).
 Pone in cachet. No. i. Da tal. No. xxx.
 Sig.: Two cachets to be taken daily.

If the iron should happen not to be well borne, tolerance may be restored by having the patient take at each meal, along with the iron preparation, a 0.2 gram (3 grain) cachet of sodium phosphate.

Another resource in case of intolerance would be to give injections of iron cacodylate or administer preparations of hemoglobin (see *Iron*, Vol. I).

B. *Digestive Medication.*—To activate digestion, hydrochloric acid and pepsin may also be used.

℞ Acidi hydrochlorici 2 c.c. (f3ss);
 Aquæ destillatæ 225 c.c. (f3viiss).
 M. Sig.: One tablespoonful in a quarter glassful of water after meals.

A pepsin elixir may be given with diluted hydrochloric acid.

If constipation is present the rhubarb in the iron pills should be replaced by aloes.

℞ Ferri protoxalatis 0.15 gram (gr. iiss);
 Nucis vomicæ pulveris 0.05 gram (gr. $\frac{3}{4}$);
 Belladonnæ foliorum pulveris 0.01 gram (gr. $\frac{1}{6}$);
 Aloes 0.05 gram (gr. $\frac{3}{4}$);
 Extracti gentianæ q. s.
 Ft. pil. No. i. Da tal. No. xxx.
 Sig.: Two pills daily.

ANOREXIA.

[*α, privative, ὁρεξις, desire.*
Lack of appetite.]

Present-day therapeutics, tending toward "specific" effects, has rid practical medicine of a large number of polypharmaceutic formulas at which the druggists themselves were the first to poke fun.

The reaction in this connection has probably overshot its mark. The art of prescribing is being lost. After all, specific medications are exceptional. Symptomatic medication, illumined by and directed in accordance with the present more thorough knowledge of pathologic physiology, often proves of decided value. In this connection, a number of formulas have come down to us from earlier generations which the medical practitioner may readily apply to advantage.

As concerns the symptom *anorexia*, we shall limit ourselves to the recalling of four somewhat time-honored formulas of **stomachic** preparations. None better are to be found in the most up-to-date works:

Pilule ante cibum (stomachic and laxative):

℞ Cinnamoni pulveris	0.02 gram (gr. $\frac{1}{8}$);
Extracti cinchonæ	0.05 gram (gr. $\frac{1}{4}$);
Aloes	0.1 gram (gr. iss);
Mellis	q. s.

Ft. pil. No. i. Da tal. No. c.

Sig.: One to two pills before meals.

Stoughton's elixir (stomachic and laxative):

℞ Aloes,	
Cascarilla:	āā 1 gram (gr. xv);
Absinthii,	
Gentianæ,	
Aurantii amari corticis,	
Rhei	āā 5 grams (gr. lxxv);
Alcoholis (60 per cent.)	220 c.c. (f̄viiss).

M. Sig.: One teaspoonful one-half hour before meals.

This formula is clearly less to be recommended than the preceding one. Yet I must admit that it has sometimes proven useful, in my experience, in obstinate cases of anorexia with atony of the stomach.

In this type of case Huchard sometimes prescribed the following drops, with good results:

℞ Tincturæ nucis vomicæ	2 c.c. (f3ss);
Tincturæ rhei	3 c.c. (m̄xlv);
Tincturæ gentianæ,	
Tincturæ calumbæ,	
Tincturæ cinchonæ	āā 5 c.c. (m̄lxxv).

M. Sig.: Fifteen or twenty drops in a little water before meals.

In all these formulas one notes a combination of the *bitters* (cinchona, gentian, bitter orange peel, absinth, etc.), the *tonics* (nux vomica, cinnamon, etc.) and the *laxatives* (rhubarb, aloes, etc.).

Lastly, *Dettweiler's mixture* for gastric atony in tuberculous cases may be recalled:

℞ Quininæ hydrochloridi	0.1 gram (gr. iss);
Pepsini	1 gram (gr. xv);
Acidi hydrochlorici diluti	3.5 c.c. (f3j);
Syrupi aurantii amari	15 c.c. (f3ss);
Aquæ destillatæ	190 c.c. (f5viss).

M. Sig.: One tablespoonful every three hours.

APPENDICITIS.

By LÉON MEUNIER, M.D.

ACUTE APPENDICITIS.

The only actual treatment for acute appendicitis is removal of the appendix. This is the only solution of the problem that is looked upon with favor at the present time. The point that is now under discussion is *the time to operate*; there are those who favor prompt operation and others who do not. Let us see how these two views may be compared on their merits.

Appendicitis Seen in the First Twenty-four Hours.—Under these circumstances operation seems to be favored by all. The mortality is very low (1 to 2 per cent.). Operative shock is reduced to a minimum and all the risks appertaining to the subsequent course of the disease are eliminated.

But can one definitely assert, in examining a case of appendicitis, that the disease set in within the preceding twenty-four hours? And how rare it is for a diagnosis to be made with certainty within this period!

Appendicitis Seen on the Second Day.—The operative mortality increases to 2 to 5 per cent. The operative risks counterbalance the risks of expectant medical treatment. Here those who favor operation and those who oppose it are at liberty to adopt the course which their feeling in the matter dictates.

Appendicitis Seen on the Third Day.—The operative mortality now reaches 12 to 15 per cent. From this time on all believe it better to abstain from operation. The latter is indicated only if the *general and local condition becomes worse*.

Medical Treatment.—Whatever decision is to be made regarding operation, the patient should be placed under the following medical treatment as soon as the diagnosis is settled:

Immediate rest in bed, with the head low.

Absolute starvation for twenty-four or forty-eight hours.

Fluids as well as solids to be abstained from.

Ice-bag to be applied continuously over the abdomen, with flannel protection intervening.

Injection of morphine if there is pain, or pills of 0.02 gram ($\frac{1}{8}$ grain) of extract of opium.

Operation in the Acute Stage.—Operation can be recommended in the following sorts of cases:

(a) **Diffuse peritonitis:** If, in twenty-four or thirty-six hours after the onset, no improvement has occurred and one of the following symptoms is observed:

The ice-bag brings no relief.

The facies continues abnormal and makes an unfavorable impression on the observer.

Vomiting persists.

The temperature ascends.

Discrepancy between the pulse and temperature.

The abdomen continues to exhibit a board-like rigidity, or becomes distended.

The misleading periods of subsidence of symptoms ("treacherous calms"—Dieulafoy) which may suddenly interrupt serious symptoms should also be remembered. *To eliminate the idea of a possible peritonitis, the improvement must be progressive, uninterrupted, and must not be manifest in respect of one or two symptoms alone, but relate to the aggregate of the functional and general symptoms.*

(b) **Encysted peritonitis.**—In this condition indications for operation may be recognized, but the matter should be placed wholly in the hands of the surgeon, who will decide in the individual case whether the operation *must or need not be carried out immediately.*

Interval Operation.—If resolution occurs the condition should be allowed to run its course and operation advised *six weeks after the temperature has returned to normal.*

As soon as resolution is established, the food given should be gradually increased:

Following a period in which water is alone permitted, a milk diet is started *four days after the temperature has subsided.*

Then, gradually, broths, purées and pastes are permitted.

It is well to keep the patient on a diet of milk and vegetables up to the time of the operation.

CHRONIC APPENDICITIS.

1. Any case of chronic appendicitis in which the history gives evidence of *one or more acute episodes* should be considered as an interval case of acute appendicitis and OPERATION advised.

2. Any case of chronic appendicitis, without an acute attack, but manifested in permanent tenderness at McBurney's point may likewise be operated.

In children, *advice to this effect should be made a rule*, for among these patients a gangrenous appendicitis may suddenly develop.

Any case of *indefinite* chronic appendicitis, associated with abdominal or general disturbances of dyspeptic nature, should be treated medically with a vegetable diet, oily or mucilaginous laxative enemas to combat constipation, and perhaps a "cure" at such resorts as Plombières and Châtel-Guyon.

Only in the event of failure of such treatment should *appendectomy* be tried.

ARHYTHMIA.

(Irregularities of heart action.)

a, from α, privative, ῥυθμός, measure.
Irregularities of heart action.

EXTRA-SYSTOLES (PREMATURE CONTRACTIONS).—

The *treatment* is plainly not that of premature contractions themselves, but of their cause.

If the premature contractions are of functional, reflex origin:

1. The *cause* should be *treated*: Aërophagia, dyspepsia or gout.
2. The *nervous irritability* should be allayed by tepid and warm tub baths; interdiction of tobacco, alcohol, tea and coffee, and the administration of valerian and especially of bromides in doses of 0.5 to 1.5 grams ($7\frac{1}{2}$ to $22\frac{1}{2}$ grains) a day.
3. Mental encouragement should be given the patient, who should, as much as possible, be relieved of his anxiety in the matter, since premature contractions produce a marked mental impression. Suitable psychotherapy of the demonstrative, affirmative and persuasive type should be availed of. Special care should be taken not to advise treatment requiring any pronounced change in the patient's occupation, otherwise he is certain to attach a serious significance to the condition.

If the premature contractions are of *lesional* (organic) origin, they are an evidence of myocarditis with a tendency to localization in the inter-auriculoventricular septum and disturbances of the functions of conductivity and irritability of the heart-muscle.

There are three indications:

1. The *neuro-cardiac irritability*, which should be treated, as already mentioned, by tepid and warm tub baths, interdiction of stimulants, bromides and valerian. There is no doubt that sparteine in a daily dosage of 0.03 to 0.1 gram ($\frac{1}{2}$ to $1\frac{1}{2}$ grains) is sometimes very effective. Sparteine may be considered one of the best drugs combining sedative and heart-tonic properties.
2. The *gradually increasing cardiac insufficiency*. The treatment may be summed up in the following few lines:
 - (a) Reduced, mixed diet under supervision, with temporary reduction cures.

(b) Exercise in moderation; walking on flat ground.

(c) Heart-tonics, cathartics and diuretics when the occasion for them exists.

(1) Sparteine rather than digitalis.

(2) Vegetable cathartics rather than saline purgatives.

(3) Squill or theobromine or both, according to the state of the kidneys.

3. The *specific* indication if the Wassermann reaction is positive.

Following is a concrete example of the treatment of one of the commonest varieties of the extra-systolic syndrome:

Palpitations (premature contractions and precordial pains) dependent upon a neuropathic and dyspeptic state.

Clinical Manifestations.—When a patient complains of his heart, there is one chance out of five that he has a heart disorder and four out of five that he is a dyspeptic neuropath.

In the latter event, which is much the more frequent, he will complain of palpitations, consisting of a feeling of acceleration of the heart, of strong, precipitate beating, and of "misfires" of the heart (premature contractions). Examination will show, aside from any premature contractions observed: 1. *A heart free of organic disease* (auscultation, percussion, fluoroscopy, blood-pressure determinations, all practically negative). 2. *Dyspeptic manifestations*, and in particular—and most frequently—gastric hypersthenia with disturbances of evacuation and a large gastric air-bubble. 3. *Nervous crethism* of varying degree, manifested, among other evidences, in exaggerated reflexes and sometimes even tremor.

Therapeutic Indications.—These are threefold:

1. To secure proper *evacuation of the stomach*, an indication met by Léon Meunier's isotonic solutions and a suitable diet.

2. *Sedation of the nervous system*, procured mainly by tepid hydrotherapeutic measures, valerian and its derivatives, and the bromides.

3. *Psychotherapy*, most of the cases occurring in "anxious" patients whom it is advisable to deliver from their obsession.

Practical Means of Attainment.—Following is a typical plan of treatment:

I. MEDICINAL TREATMENT.

1. *Every day for the first ten days,*

And also on alternate days in the second ten days and twice a week thereafter, a teacupful of warm water with a teaspoonful of the following powder added should be given in the morning on awakening and at night on retiring:

℞ Sodii sulphatis,
 Sodii citratis,
 Sodii phosphatis,
 Sodii bicarbonatisāā 5 grams (gr. lxxv);
 Lactosi 180 grams (℥vj).
 Misce bene.

2. *For the second ten days:*

℞ Sodii bromidi 10 grams (℥iiss);
 Syrupi aurantii amari 225 c.c. (f℥viiss).

M. Sig.: One dessertspoonful three times daily in the middle of the meals.

3. *For the third ten days:*

Pills of extract of valerian, each containing 0.1 gram ($1\frac{1}{2}$ grains).
 Three pills daily between meals, with a cup of orange-flower infusion.

II. DIETETIC TREATMENT:

A *moderate mixed diet*, with avoidance of:

Fats and fatty foods; acid and raw foods.

Starches and flours.

Shell-fish, preserved meats, etc.

Training in mastication.

Only one glass of fluid with each meal.

A cupful of an infusion of star-anise (Illicium verum) at the end of the meal.

III. HYDROTHERAPEUTIC MEASURES.

Daily lukewarm tub baths.

Baths at 36 to 38° C. (96.8 to 100.4° F.) for 12 to 15 minutes twice weekly.

IV. PSYCHOTHERAPY.

The patient should be positively told that there is no organic heart disease.

Paraphrase the dictum: "The heart is the witness and victim; the stomach and nervous system are alone guilty."

Abstain completely from heart medication.

PAROXYSMAL TACHYCARDIA.—The treatment is divided into that of the attack and that prescribed in the intervening periods.

During the attack anything may succeed and anything may fail. The following measures have been seen to succeed and should be tried: Absorbent powders calculated to prevent distention, the application of an abdominal belt, and an ice-bag over the precordium. Nauseant medication (ipecac in divided doses) and the giving of digitalis and strophanthus have been followed—whether through definite action or mere coincidence—by favorable results in a few cases. Fiessinger reported having observed abrupt cessation of a

few attacks after a respiratory exercise consisting of a few deep inspirations followed by prolonged expirations. Mougeot has obtained slowing of the pulse by hypodermic injections of 0.001 to 0.002 gram ($\frac{1}{65}$ to $\frac{1}{32}$ grain) of physostigmine sulphate or salicylate in oily solution and by daily administration by mouth of 0.001 to 0.003 gram ($\frac{1}{65}$ to $\frac{1}{21}$ grain) of physostigmine sulphate. Voisin and Benkman reported similar results from compression of the eye-balls. These are suggestions to be borne in mind. But generally all measures fail; the attack stops in its own good time.

The patients instinctively assume some 'definite posture: Some remain in recumbency, others sit with their head between their knees, and others still prefer to walk about a little.

The diet should, at all events, be of reduced amount, easy to digest, and divided into small meals. It should be noted that, as is the case also in premature contractions, deglutition and, it seems, more especially the passage of fluids through the cardia, results in some subjects in a recrudescence of the discomfort or even in the starting of a fresh attack, so that during an attack they instinctively avoid swallowing anything.

In the *intervals between attacks* the treatment should be precisely that already described under premature contractions.

RESPIRATORY (SINUS) ARHYTHMIA.—In this condition there is but one therapeutic indication, *viz.*, that of reassuring the patient and his associates and of avoiding, in this connection at least, the institution of any form of treatment, which could result only in the patient's believing and fearing that he was really suffering from some pathologic condition.

AURICULOVENTRICULAR DISSOCIATION (HEART-BLOCK).—It is difficult to present a comprehensive description of the treatment of this condition.

The **first indication** is obviously to treat the possible *cause* of the lesion or functional disturbance—specific treatment in syphilis, sodium salicylate in rheumatism, and anti-infectious measures in pneumonia, typhoid fever and infectious disorders in general.

Experimentally, Daniel Routier has shown that under certain circumstances the administration of *adrenalin* is capable of bringing the auriculo-ventricular dissociation to an end and relieving the block. Since then, a number of clinical observations have confirmed this experimental fact. Rather large doses, such as 20 to 40 drops of the 1:1000 solution, were sometimes required. Probably the adrenalin acts as the physiologic stimulant to the sympathetic, antagonizing the vagus,

and as a stimulant to intracardiac conductivity, which it restores when the break is not complete, as seems to be more commonly the case.

The **second indication** is that relating to the *myocarditis* and *cardiac insufficiency* in general. Let us recall briefly and somewhat sketchily in this connection the indications for and contraindications to digitalis in auriculoventricular dissociation.

I.—In the first place, we may recollect the following three facts:

1. Stimulation of the vagus reacts directly on the auricular contractions, which it diminishes, and only indirectly on the ventricular contractions, through the auricles and the bundle of His.

2. Digitalis, as a powerful stimulant of the vagus, slows primarily and directly the auricular contractions, and secondarily and indirectly the ventricular contractions.

3. Digitalis, as a direct stimulant to the heart-muscle, acts strongly on the ventricles, the contractions of which are thereby enhanced, and only weakly on the auricles.

Applying the foregoing facts to the cases of heart-block, one can readily see that in a case of *partial heart-block* in which, for instance, the number of ventricular contractions is but one-third of that of the auricular contractions, administration of digitalis will be dangerous in that by reducing the number of auricular contractions it will further diminish the number of these contractions which will be capable of stimulating the ventricles through the bundle of His [also in that digitalis itself tends to lower the conductivity of the bundle of His—Tr.]; a fatal attack of the Stokes-Adams type may result. In a case of *complete heart-block*, the auricular and ventricular contractions are completely independent; administration of digitalis will slow and somewhat enhance the auricular contractions, which fact, since the bundle of His is destroyed, will have no effect on the frequency of the ventricular contractions; on the other hand, the direct action of digitalis on the ventricular muscle will be manifested in more rapid and more powerful contractions.

In a case reported by Bachmann, the ratio of the auricular to the ventricular beats, which had been 3.72:1 in complete heart-block, dropped to 1.45:1 upon administration of digitalis, thus approaching much closer to the norm.

In short, *digitalis may be indicated in cases of complete heart-block, but is generally contraindicated in cases of partial block.*

II.—These points relating to pathologic physiology permit of more precise solution of the much discussed problem of the *administration of digitalis in mitral stenosis*. Huchard favored a positive answer to this question, while Potain espoused the negative.

Hare and Mackenzie, on the basis of the foregoing considerations, answer "yes and no;" "yes," if the stenosis is of slight degree, if the heart-rhythm is not materially affected, if the usual evidences of ventricular insufficiency are observed—in short, if the functioning of the bundle of His appears to be normal; "no," if the disease which brought about the stenosis also involved the auriculoventricular bundle, causing it to become less or more irritable. If there is reduced irritability of the bundle, a partial heart-block results, and this condition, as we have seen, contraindicates the use of digitalis. If there is increased irritability, contraction of the heart-muscle may, in conformity with a law of general application in disease, begin at the region which is over-irritable, the heart rhythm be inverted thereby, and ventricular systole commence a fraction of a second before auricular systole; digitalis, stimulating further this over-irritable tissue, can only increase the discrepancy and aggravate the cardiac insufficiency, and is, therefore, again contraindicated.

III.—Certain easily elicited clinical signs afford evidence of the presence of these disturbances of cardiac conductivity, to wit:

1. The observation of *jugular pulsations* and, *a fortiori*, of *liver pulsations synchronous with the ventricular contractions*, betokening simultaneous or even reversed contraction of the right auricle and ventricle.

2. The observation of more or less regular *intermittences of pulsation*, due to lowered irritability of the bundle of His.

3. The observation by means of sphygmograph tracings of certain cardiac irregularities, *viz.*, *true or pseudo extra-systoles*.

To these evidences may well be added:

4. In mitral stenosis of marked degree, *disappearance of the presystolic murmur*—an expression of the inability, at least partial, of the auricle to propel the blood through the stenotic orifice, *i.e.*, a state of distention and paresis of the "forced" auricle.

Stimulation of the right ventricle by digitalis could not but increase this dangerous overfilling of the already failing left auricle and aggravate the circulatory difficulty.

For practical purposes, then, it may be concluded that **in mitral stenosis digitalis is contraindicated under the following circumstances:**

1. Disappearance of the presystolic murmur.
2. Observation of jugular or hepatic pulsations synchronous with the cardiac contractions.
3. Observation of cardiac intermittences.
4. Observation, on sphygmograph tracings, of disturbances of cardiac conductivity (heart-block).

The **third indication** is that relating to the presence of *syncopal* or *epileptoid attacks*. The preventive treatment consists obviously in proper treatment of the cause and good general hygiene. Systematic treatment with belladonna and adrenalin has sometimes given excellent results in my experience. As for the treatment of the attacks themselves, amyl nitrite inhalations and hypodermic injections of camphor in oil, strychnine and oxygen gas are definitely indicated.

THE ALTERNATING PULSE.—Some recent observations of Gallavardin and others appear to have slightly mitigated the unfavorable prognosis of *pulsus alternans*, hitherto regarded as portending a fatal ending within a relatively short time.

Complete mental and physical rest; a substantial but easily digested diet given in small meals at regular intervals; general tonic medication and drugs acting favorably on the nervous mechanism of the heart (cinchona, glycerophosphates, strychnine, sparteine, oxygen injections, champagne, etc.) and symptomatic measures as required (cupping, mustard poulticing, diuretics, etc.) constitute the main factors in the treatment.

AURICULAR FIBRILLATION.—In this condition *digitalis* is positively and definitely indicated, and excellent results may generally be expected from it during and even independently of the periods of special heart weakness.

In these cases the patient should be:

1. Put to bed for a few days.
2. Placed on a reduced diet (small meals at regular intervals).

Under these two measures the heart-rate will generally show some reduction, though still remaining high, and the arrhythmia will become less marked.

3. With the patient still in bed, *digitalis* preparations should then be begun. In the course of three to five days 0.8 gram (12 grains) of *digitalis* leaf (0.2 gram—3 grains—a day); or 3 c.c. (45 minims) of *digalen*, or 1 milligram ($\frac{1}{60}$ grain) of French *digitalin* [*digitoxin*] should be given. [More than these amounts may be required. A satisfactory plan, for some cases at least, would appear to be that of P. D. White, who sometimes gives 0.2 gram (3 grains) of *digitalis* leaf every four hours, to be continued until the *apex rate* falls below 80 or until the patient is toxic, as shown by nausea or a coupled pulse.—Tr.]

Under this measure:

Either no change of heart rhythm is observed—an exceptional result—in which case the prognosis is grave and little can be expected from any drug treatment.

Or, on the other hand, the heart rate is brought down within the normal range and the irregularity very markedly reduced.

4. The patient may then be allowed to get up and the effects of the standing posture and of walking on the irregularity should be carefully recorded.

If the arrhythmia shows but a slight recrudescence, very small doses of digitalis and a proper mode of life, with exclusion of fatiguing exertions, emotional impressions and overeating, will often be sufficient to maintain a satisfactory *modus vivendi*. One might prescribe, *e.g.*, 10 to 15 drops of digalen or 0.1 milligram ($\frac{1}{1050}$ grain) of French digitalin two or three times a week, or, as advocated by Huchard and Mayor, 0.05 or 0.033 milligram ($\frac{1}{1800}$ or $\frac{1}{2000}$ grain) of French digitalin or 5 drops of digalen daily. Often the patient under such treatment will be able to resume all or a part of his customary occupations.

If, on the other hand, the arrhythmia reappears in its original intensity, the reserve power of the heart is practically exhausted. Almost absolute rest and repeated courses of digitalis in rather high dosage may be indicated.

Digitalis medication is thus both of remedial and of prognostic service. Where digitalis fails, the other heart-tonics—strophanthus, convallaria, sparteine, etc.—will fail likewise.

Associated manifestations such as congestive states, edema, etc., should, of course, be concurrently treated. Where digitalis has failed previous to venesection, cupping or paracentesis—according to existing indications—it will sometimes succeed most signally after the application of these measures.

Quinine seems sometimes to be a useful adjunct to digitalis in auricular tachysystole and fibrillation. The optimal dosage *per diem* is 0.6 gram (10 grains), according to Schrumpf (*Presse méd.*, July 31, 1920).

Quinidine, an optical isomer of quinine, has been used with success in ascending amounts of 0.3 to 1.2 grams (5 to 18 grains) a day, divided into three doses, by the mouth, for three to six days. Tablets containing 0.2 gram (3 grains) each are generally used.

It has proven really effective only in one form of arrhythmia, *viz.*, auricular fibrillation. Even in these cases the results are uncertain (favorable in 50 per cent. of cases, according to Clerc and Deschamps) and in the majority of instances only temporary.

Dangers and Contraindications of Quinidine.—Serious consequences are exceptional and will become increasingly rare as more is learned of the contraindications and the technic of the treatment (Lian).

Cases of *acute cardiac insufficiency* have been reported, but at the present time the quinidine treatment is preceded by a course of digitalis,

and the quinidine is prescribed only if the heart has reacted favorably to the digitalis.

Fainting spells have also been noted: These will become more and more rare if the method of gradually increasing doses is employed.

Quinidine, which interferes with the conductivity of the heart muscle, has in exceptional instances caused a *bradycardia through auriculoventricular dissociation*, either with or without complicating vertigo or faintness. For this reason quinidine must be avoided when auricular fibrillation is accompanied by some degree of bradycardia.

The real danger is *embolism*: Intra-auricular clots may be mobilized by auricular contractions that have become more regular and more effective. This drawback, however, is one which attends the use of all active cardiac drugs.

Cases of respiratory paralysis have been reported. Many fatal cases have been recorded.

Other Possible Untoward Effects.—Aside from these serious consequences, there are certain possible unpleasant effects of which the patient should be warned, *viz.*, cramps and diarrhea (to avoid these, fruit, green vegetables, and if need be, also milk and eggs should be interdicted), headache, dizziness, tinnitus, and sometimes staggering.

Quinidine may induce a regular tachycardia which necessitates the administration of digitalis.

Technic of the Treatment.—In auricular fibrillation it is the rule to institute first a course of a heart- tonic such as digitalis or ouabain.

Quinidine is then ordered in increasing doses, which allow of testing the susceptibility of the patient. Thus, according to Lian, on the first day one tablet may be given. The dose is then increased by one daily up to six or eight; rarely is a dosage of ten tablets necessary to obtain regularization of the rhythm. The large dose is continued for one or two days, and the amount then reduced by one tablet daily or every other day until five tablets a day are reached. The first course of quinidine treatment should be kept up at least two weeks.

In the event of failure, another attempt should be made later. Generally the arrhythmia reappears at the end of a few days or weeks.

Results obtained are often permanent, according to Lian, if the patient is placed on a maintenance treatment. After the first course of the drug, for three weeks the patient is to have alternately for five days five tablets daily, then for five days 0.1 mgm. of crystallized digitalin daily. Lastly, for the first five days of the week the patient is to take four to five tablets daily, and for the first five days of the second week, 0.1 mgm. of crystallized digitalin, and so on.

[Another plan commonly followed is to give at first two test doses of 0.2 gram (3 grains) each of quinidine sulphate, in capsules or cachets, two hours apart, and if no toxic evidences of cinchonism appear, to begin treatment with 0.4 gram (6 grain) amounts at two-hour intervals for five doses a day, continuing this for a few days until the heart rhythm becomes regular or toxic symptoms appear.—Tr.]

Results.—The treatment is successful in over half the cases. Marked diminution of the functional disturbances is almost always observed.

In *premature contractions* some observers have obtained good results with three tablets of 0.2 Gm. (3 grains) each daily.

In *paroxysmal tachycardia* a few successful results have been obtained with three or four tablets a day. Between attacks quinidine may be prescribed to postpone their return.

ASCITES.
Abdominal dropsy.

[ἄσκος. a water-bag; an abdomen
having the shape of a water-bag.*]

The treatment of **ascites** obviously depends upon the cause of the condition. A table showing the various possibilities in this direction need alone be presented here. (See also under *Therapeutic Procedures: Paracentesis Abdominis*).

* * *

When tapping is indicated, it should be carried out with the utmost care as to antiseptic precautions. While it is exceptional for the peritoneum to become infected during this procedure, various evidences of infection about the site of puncture (erythema, lymphangitis, and even erysipelas) are rather frequently observed.

Evacuation should be neither too rapid nor too complete. Grave results from dilatation of the heart and collapse have been observed in weakened patients in the course of copious tapplings. I have personally witnessed the death during the fifth paracentesis of a case of mitral disease with ascites which had passed into the stage of cachexia; only energetic treatment, including the four previous tapplings, had enabled this patient to live a few extra months.

In any case, it will be well to administer a stimulant injection of camphor in oil, strychnine or sparteine before the paracentesis.

* * *

Tagliavante (*Prensa Med. Argent.*, Nov. 20, 1918) has advocated, for **continuous drainage** of the ascitic fluid, the use of a silver "button-cannula" resembling somewhat a modified tracheal cannula. The single case he described was in no wise convincing, but his suggestion is worth remembering.

* * *

In cirrhosis of the liver with ascites, tapping is only a makeshift; the fluid reforms, tapping becomes more and more frequent, and the patient becomes cachectic.

Intravenous injections of cyanide of mercury in the dose of 0.01 to 0.02 gram ($\frac{1}{6}$ to $\frac{1}{3}$ grain) in courses of 20 daily injections may induce rapid disappearance of the ascites, either because syphilis was an

TREATMENT OF ASCITES.

CAUSE OF ASCITES.	INTERNAL TREATMENT.	EXTERNAL OR OPERATIVE TREATMENT.
<p>ASCITES OF HEPATIC ORIGIN.</p> <p>(Type: <i>Atrophic cirrhosis.</i>)</p>	<p>Restricted milk diet, or fruit diet, or milk and vegetable chloride-free diet.</p> <p>Diuretics: Lactose, 20 grams; theobromine, 1 to 3 grams. Pills of squill, scammony, digitalis and calomel.</p> <p>Liver organotherapy by the mouth, or better, by rectum (macerated fresh liver).</p> <p>In the presence of syphilis: Specific treatment.</p>	<p>Tapping, for pressure symptoms, dyspnea or digestive disturbances. Merely palliative. To be repeated only according to needs.</p> <p>Talma's operation (fixation of the omentum to the abdominal wall). Aims to divert the blood toward the vena cava. Attended with risk and uncertain in results.</p>
<p>ASCITES OF PERITONEAL ORIGIN.</p> <p>(Type: <i>Tuberculous peritonitis.</i>)</p>	<p>Constitutional treatment for tuberculosis.</p>	<p>Painting with flexible collodion.</p> <p>Tappings.</p> <p>Tappings with medicinal injections (betanaphthol and camphor, 1:2, 10 to 20 c.c.; or iodoform-glycerin, 5%, 1 c.c.).</p> <p>Simple laparotomy.</p> <p>Laparotomy with evacuation of cheesy pockets with Calot's syringe and injection of creosote in oil.</p>
<p>ASCITES OF CARDIAC ORIGIN.</p> <p>(Type: <i>Heart failure.</i>)</p> <p>Always the result of a secondary cardiac cirrhosis.</p> <p>(See <i>Heart Failure.</i>)</p>	<p>Restricted milk diet or fruit diet.</p> <p>Restricted chloride-free diet.</p> <p>Heart-tonics and diuretics: Digitalis, squill, theobromine.</p> <p>Calcium chloride.</p> <p>Potassium salts.</p>	<p>Wet cups over the region of the liver.</p>
<p>ASCITES OF RENAL ORIGIN.</p> <p>(Type: <i>Chronic nephritis.</i>)</p> <p>Exceptional in the absence of an associated hepatic or cardiac lesion.</p>	<p>Restricted milk diet or fruit diet.</p> <p>Restricted chloride-free diet.</p> <p>Diuretics and heart-tonics: Theobromine, squill, lactose, strophanthus, digitalis.</p> <p>Calcium chloride.</p> <p>Potassium salts.</p>	<p>Wet cups over the kidneys; sometimes venesection.</p>

TREATMENT OF ASCITES (*continued*).

CAUSE OF ASCITES.	INTERNAL TREATMENT.	EXTERNAL OR OPERATIVE TREATMENT.
ASCITES OF DYS-CRASIC ORIGIN. <i>(Type: Cachexia.)</i> (Tuberculosis; neoplasm.)	Palliative treatment; mor- phine for the pain.	Palliative tappings in the event of massive trans- udation.
ASCITES OF PYLEPHLEBITIC ORIGIN. Very exceptional.	Palliative treatment; mor- phine for the pain.	Palliative tappings in the event of massive trans- udation.
CHYLOUS ASCITES. Rare in temperate climates.		Repeated tappings.

etiologic factor of the cirrhosis, or by reason of the diuretic properties of the mercurial treatment acting alone.

* * *

Autoserotherapy of ascites has been attempted. It consists:

Either of hypodermic injections of small amounts of the ascitic fluid: Three to 10 c.c. ($\frac{3}{4}$ to $2\frac{1}{2}$ fluidrams) of the fluid are obtained by aseptic puncture; after making sure that the fluid is not purulent, the operator at once reinjects it in the subcutaneous cellular tissue. The injections are repeated two or three times a week.

Or, of massive hypodermic injections of 200 to 500 c.c. (7 to 16 ounces) of the fluid (Castaigne). Aside from the apparatus used, which is simply a large syringe or Potain's aspirating outfit, the technic is the same as in the preceding procedure. The injection is repeated weekly, if necessary.

Intravenous injections (Sicard and Galup) are certainly not to be recommended. They expose the patient to serious untoward results.

In general, the therapeutic results obtained with this method are by no means conclusive.

ASTHENIA AND FATIGUE.

[from *α*, *privative*; *σθένος*, *strength*.]
Deprived of strength.

Next to pain and sleeplessness, this is probably the symptom which the practitioner will most often be called upon to combat, or at least the one on account of which he will most often be consulted. Fortunately, it is also one of the symptoms in respect of which we are best provided with remedial agents.

In the case of this symptom, as with all other symptoms, it should be thoroughly understood that the treatment of the cause is the essential treatment, and that in asthenia of syphilitic or malarial origin, the specific treatments with arsenic and mercury or arsenic and quinine will take the lead over all other measures; yet asthenia can and should also be treated independently.

From the standpoint of practical requirements, the cases of **asthenia** may be divided into two groups:

1. The cases of *asthenia associated with low blood-pressure*, or *neurovascular asthenias*, the asthenias of depressive psychoneuroses, of the anemias and of hyposphysia; infectious and post-infectious asthenias, *e.g.*, those of tuberculosis, syphilis and malaria, post-influenzal and post-typhoid asthenias, etc.

2. The cases of *asthenia associated with high blood-pressure*, those of nitrogen retention, of arteriosclerosis, of Bright's disease, etc.

ASTHENIA WITH LOW BLOOD-PRESSURE.—Many effective therapeutic agents are available for use in this condition:

1. Foremost among these, and standing well above the others, is **strychnine**, which is practically a specific for *neurovascular asthenia*, constituting essentially a stimulant to motion and reflex action. The various indications for its use have already been described in Part I (see *Strychnine*). The fact may be mentioned that strychnine, even in moderate dosage, causes a markedly increased secretion of adrenalin.

2. *Endocrin medication* comes next, and in particular, **adrenalin**. This substance yields its most definite results in the post-infectious asthenias, related to adrenal insufficiency, which is almost constantly present in these cases (see Part I: *Adrenalin*).

3. **Arsenic and iron**, which promote the production of blood cells and of hemoglobin and are in a measure specifics for the anemias, exert a very useful effect in antagonizing the anemia that almost always accompanies asthenia.

4. The time-honored tonic remedies, phosphorus and cinchona, suitably administered, often prove highly useful adjuncts. *Phosphoric acid*, in the psychasthenias with hyposthenic dyspeptic manifestations, and *sodium glycerophosphate* injections and *extract of cinchona*, in convalescence from infectious diseases, may be combined with the foregoing agents—strychnine and adrenalin.

5. **Graded hydrotherapeutic measures**, passing from the *cool* ablution, to the *cold* douche, will sometimes prove extremely effective, but only provided extreme care and supervision be given to the matter of dosage. Everything should depend on the manner in which the patient reacts; there are some individuals who will not react even to the mildest modalities of cold hydrotherapy, and who remain uncomfortable, shivering, and covered with "goose-flesh," after the least sort of a cold ablution. The remedy under these conditions is worse than the disease.

It is well not to forget that the treatment of asthenia demands a gradual, patient, methodical training of the patient to withstand fatigue, cold, and various strong occupational and emotional impressions, and should, therefore, be based solely on actual trial and observation of the mode of reaction to hydrotherapy in the individual case.

6. **Myotherapy, exercise, games and sports** should receive the same careful attention. Their performance should be regulated along the lines of a systematic, progressive physical training.

7. **Alimentary and sexual hygiene** should likewise receive careful supervision and regulation.

The diet should be substantial, but not excessive, and any increase over the average amounts should be gradual; a moderate gain in weight is often desirable. There are three difficulties to be avoided: Impaired nutrition, dyspepsia and gavage.

8. Lastly, **psychotherapy** may and often does play an important and sometimes a preëminent rôle, especially in psychasthenia, neurasthenia and the depressive psychoneuroses.

It should be applied in two directions:

(a) The physician should ascertain whether there is not present, at the bottom of the nervous depression, some purely mental cause (either of the higher type, such as a death in the family, personal difficulties or mental distress, which has actually removed the patient's reason for living; or of a baser order, such as wounded pride,

envy or spite, which is poisoning the patient's life), and, bringing into play all the resources of his mind and heart, should strive to find the words and gestures which soothe and console, and the ideas, representations and examples which uplift and purify. He should become the educator and comforter of the patient. This is the most delicate and noble task which our profession is called upon to carry out, but it cannot be learned from any book. And to how many of us who read these lines will there not be suggested the injunction: "*Medice, cura te ipsum*"!

(b) Furthermore, the practitioner should strive by conscious or unconscious suggestion to awaken and restore in his patient faith and confidence—faith in his recovery and future, confidence in himself and in his physician. The personal, psychic, energizing influence of the therapist is sometimes the predominant factor in this direction.

The above general directions apply to all cases of asthenia with low blood-pressure.

In **post-infectious or pretuberculous forms of asthenia** special stress should be laid on:

1. Fresh air treatment, rest, generous diet and progressive physical training.
2. Cinchona, tannin, strychnine and adrenalin.

In conclusion, the clinical instructions relating to a case of **post-infectious (influenzal) asthenia** in a subject predisposed to tuberculosis may be presented thus:

1. Comparative rest: Patient to stay in bed at least nine or ten hours. Walks of increasing duration, regulated according to the temperature readings.
2. Regular, substantial meals, without excesses.
3. Fresh air constantly, with breathing exercises in moderation.
4. *Internal medication:*

For ten days:

R. Strychninæ sulphatis	0.03-0.1	gram	(gr. $\frac{1}{2}$ -iss);
Sodii arsenatis (N. F.)	0.1	gram	(gr. iss);
Sodii glycerophosphatis (N. F.)	10	grams	($\bar{5}$ iiss);
Extracti cinchonæ	20	grams	($\bar{3}$ v);
Spiritus vini vitis	40	c.c.	(f $\bar{3}$ x);
Glycerini	q. s. ad 150	c.c.	(f $\bar{3}$ v).

Ft. sec. art.

Sig.: One teaspoonful in a little water three times daily with the meals.

Or, daily hypodermic injection of 1 to 4 c.c. (16 to 65 minims) of the following solution:

℞ Strychninæ sulphatis	0.04	gram	(gr. $\frac{1}{2}$);
Adrenalin	1	gram	(gr. $\frac{1}{2}$);
Sodii glycerophosphatis	4	grams	($\frac{1}{2}$);
Aquæ destillatæ	40	c.c.	($\frac{1}{2}$).

Sterilisa.

For the next ten days:

Adrenalin chloride solution, 1:1000, 20 drops in a little water three times a day between meals.

For the last ten days in the month:

Some preparation to stimulate red cell formation, such as serum from bled horses, hemoglobin, etc.

* * *

ASTHENIA WITH HIGH BLOOD-PRESSURE.—In this condition, the result of nitrogen retention, arteriosclerosis and Bright's disease, and constituting an organic form of asthenia contrasting with the preceding group of cases, which relate to functional disturbances that are frequently curable, we are much more helpless.

Aside from the major indication relating to the treatment of the primary cause, recourse may be had:

To phosphoric acid:

℞ Acidi phosphorici diluti	50	c.c.	($\frac{1}{2}$);
Sodii biphosphatis	20	grams	($\frac{1}{2}$);
Aquæ destillatæ	160	c.c.	($\frac{1}{2}$).

M. Sig.: Three to six teaspoonfuls a day with the meals.

To the formates:

℞ Sodii formatis	10	grams	($\frac{1}{2}$);
Sodii bicarbonatis	5	grams	(gr. $\frac{1}{2}$);
Syrupi aurantii amari vel cacao	150	c.c.	($\frac{1}{2}$).

M. Sig.: Two or three tablespoonfuls a day.

To stimulating rubs, always a useful measure.

To fresh air, to be supplied as constantly as possible.

Carbonated baths may be serviceable.

A stay in a *warm, dry, sunny climate* is obviously in most instances strongly indicated.

COMA.

[Κῶμα. *Drowsiness, suspension of the mental functions.*]

The forms of coma with which the practitioner most often has to deal are: Apoplectic coma, uremic coma, diabetic coma, alcoholic coma, and post-epileptic coma.

Infectious coma (typhoid, infectious jaundice), post-traumatic coma (skull fracture), inflammatory coma (meningo-encephalitis), toxic coma (opium, morphine) and neoplastic coma (brain tumor) are much less common.

APOPLECTIC COMA.

1. *Venesection*, 200 to 500 c.c. (6 to 16 ounces), the application of *leeches* behind the ears, or at least the use of *wet cups* over the liver or kidneys are, in the order of diminishing therapeutic power, the depleting procedures which should be brought into play as emergency measures if plethora and high blood-pressure are at all in evidence—as is the rule in cerebral hemorrhage.

If, on the other hand, as may be observed in brain softening, the pulse is small, thready and irregular, and cardiovascular weakness is obvious, with a tendency to cooling of the body tissues, injections of *camphor in oil* or of *caffeine* should be given every fifteen minutes and external heat applied (hot-water bottles, etc.).

2.—The *purgative enema* (sodium sulphate, 30 grams—1 ounce,—senna leaves, 8 grams—2 drams,—and water 300 to 500 c.c.—10 to 16 ounces) is another time-honored procedure which the most recent clinical experience could not fail to endorse.

3. The same is true of the application of *cold compresses* or even of an *ice-bag* to the head and of *mustard poulticing of the lower extremities* (thighs and legs).

4. *Evacuation of the bladder* with the catheter is a measure always to be recommended.

5. In the presence of cyanosis and a tendency to asphyxia, the chest should be covered with *dry cups* or an extensive application of *mustard* to the chest carried out.

6. In the event of epileptoid attacks, an *enema of chloral hydrate* (2 grams—30 grains) may be administered.

7. The *lesser hygienic measures* are of extreme importance in comatose cases:

(a) Frequent careful cleansing of the mouth and teeth with pledgets of cotton mounted on hemostats and moistened with a 1 per cent. solution of sodium salicylate or with Vichy water. The gum margins should, if necessary, be treated with a mixture of equal parts of tincture of iodine and tincture of cochlearia.

(b) Careful toilet of the skin, especially in regions the most subject to necrosis because of the dorsal decubitus and soiling by the urine and feces (buttocks, sacrum, trochanteric surfaces). The buttocks should rest on a soft, thoroughly dry and thoroughly clean cloth, folded twice and itself overlying a layer of some impervious material and a folded sheet; these articles should be renewed as often as necessary. The skin surface should be carefully cleansed, dried (with alcohol if need be) and dusted, if required, with some bland powder (talcum or lycopodium), or anointed with some thick paste (starch, zinc oxide 1:10, lanolin, vaselin 1:20).

If necrosis occurs, the ulcerations should be washed with some alcoholic preparation and dressed with Lucas-Championnière's powder, formulated thus:

℞ Iodoformi,
Cinchonæ,
Benzoini,
Magnesii carbonatisāā 100 grams (ȝiij);
Olei eucalypti 12.5 c.c. (fȝiij).
Ft. pulv. tenu. et m. accur.

(c) At the start, the patient is unable to swallow food. As the ability to swallow returns, a few spoonfuls of Vichy water should be given, then milk, simple infusions and fruit juices.

8. Treatment of the cause, if any is known, should be carried out in conjunction with the foregoing measures; antisiphilitic treatment is not infrequently indicated.

UREMIC COMA.

The initial indications—venesection, enema, purgative, mustard application, catheterization, chloral hydrate enema (or even chloroform inhalation) in the presence of convulsions, rhythmic traction on the tongue in the presence of cyanosis, and minor hygienic measures—are identical with those already described.

In addition, mention may here be made of the feasibility of giving:

1. *Hypodermic injections of oxygen gas* ($\frac{1}{2}$ to 2 liters), which in my experience have sometimes seemed to exert a favorable effect on diuresis, dyspnea and the state of coma itself.

2. *Hypodermic injections of physiologic salt solution* ($\frac{1}{4}$ to 1 liter in 24 hours), formerly warmly recommended, but more lately condemned by reason of our added knowledge of chloride retention. There is no doubt that saline injections have in the past done harm to many uremic cases with chloridemia; but they are undoubtedly still capable of being of much service in many comatose uremic cases with nitrogen retention. If the blood-pressure is not greatly in excess of the norm, if there is no edema, and if the output of urine is considerably reduced, there is frequently advantage in trying hypodermic injections of saline solution, given cautiously and in ascending, well spaced doses of 100, 200, then 300 c.c. ($3\frac{1}{3}$, $6\frac{2}{3}$ and 10 ounces), alternated, if need be, with like amounts of glucose solution. (See Part I: *Diuretics and Artificial Serums*.)

A fruit diet (fruits, fruit juices, cooked fruits, and simple infusions) is often the best diet in this type of case.

DIABETIC COMA.

In the precomatose period, frequently detected by the careful observer through the increased amount of acetone in the urine, the digestive disturbances and the apple-like, acetone odor of the breath, the following measures are indicated:

1. A milk diet with alkalis: *Milk and alkalis in large doses*—at least 20 grams (5 drams) of sodium bicarbonate a day, or two or three bottles of Vichy water.

2. Repeated purgation with *sodium sulphate* or some drastic cathartic, e.g., compound tincture of jalap, or scammony.

3. Injections of insulin (see treatment of *Diabetes Mellitus*).

Established diabetic coma was, before the advent of insulin, almost beyond the resources of medical science. Few cases of diabetic coma recovered. The therapeutic measures [other than insulin] which have shown themselves the least ineffectual are:

1. *Hypodermic, or better, intravenous injections of salt solution with addition of sodium bicarbonate:*

℞ Sodii bicarbonatis 10 grams (3iiss);
Liquoris sodii chloridi physiologici 1 liter (Oij).

Sterilisa.

Sig.: For intravenous injection (2 to 6 liters in the 24 hours).

In the presence of chloride retention, a 1 per cent. solution of sodium bicarbonate had better be injected instead. Salin and Sicard

even advocate the use of a (sterilized) 10 per cent. solution of sodium bicarbonate in these cases, administering 100 to 250 c.c. (3 to 8 ounces) at one injection.

Cambridge has recommended even larger doses, such as 50 to 60 grams ($1\frac{2}{3}$ to 2 ounces) of sodium bicarbonate as a maximum single dose, and sometimes 150 to 200 grams (5 to $6\frac{2}{3}$ ounces) for the entire course of treatment. The solution should be sterilized and injected very slowly into a vein; $\frac{1}{2}$ to one hour is to be taken in injecting $\frac{1}{2}$ to 1 liter of the solution. The solution should be warmed to body temperature. The injection is to be repeated every six, twelve or eighteen hours, according to indications.

2. *Venesection*, repeated if required—300 to 600 c.c. (10 to 20 ounces).

3. *Drastic cathartics* (compound jalap tincture given through a tube) or *purgative enemata*.

4. *Inhalations*, and more particularly *copious hypodermic injections of oxygen gas* (1 to 5 liters).

As auxiliary agents, digitalis, caffeine, camphor in oil, and strychnine may be indicated if progressive neurocardiac asthenia develops.

[Insulin has led to a radical improvement in the results in these cases. Even in advanced coma, recovery almost always occurs under repeated intravenous injections of insulin in conjunction with enough glucose to obviate reduction of the blood sugar to a dangerously low level. A suitable dosage of insulin is 20 units every 3 hours. Preferably, the blood sugar and blood carbonates should be determined before each dose, to serve as a guide for subsequent dosage. If these tests are not feasible, the urine sugar and ferric chloride reactions should be carefully watched. When the latter becomes faint or blood carbonate has returned to normal, the intervals between insulin doses may be lengthened to 6 or 8 hours. If, after 60 units of insulin have been given in three intravenous injections, the blood alkali has not risen markedly, Olmsted and Kahn advocate the additional administration of sodium bicarbonate intravenously in doses of 25 to 50 grams ($\frac{5}{6}$ to $1\frac{2}{3}$ ounces).—Tr.]

ALCOHOLIC COMA.

This requires at the most a purgative enema and the administration of an emetic, if possible. As a matter of fact, such cases very frequently represent combinations of alcoholism with uremia, apoplexy or acetonemia (diabetes), and under such circumstances the treatment of these latter conditions is the more important.

POST-EPILEPTIC COMA.

No special indications attach to this condition. The cases should be left alone, and will recover spontaneously. The epilepsy is, of course, to receive proper treatment. (See *Epilepsy*.)

INFECTIOUS COMA AND POST-TRAUMATIC COMA.

Aside from the treatment of the causal infection, *e.g.*, by baths, specific treatment, etc., or from surgical intervention (removal of sequestra, decompression, craniectomy, etc.), these conditions are often benefitted, as in the case of the *inflammatory comas* (meningo-encephalitis), by *lumbar puncture*, repeated if necessary. This is true, indeed, of all cases in which increased intracranial pressure is a factor in the causation of the disturbance (coma in *brain tumor*).

TOXIC COMA.

A few special indications are to be met in these cases. If the comatose state is the result of absorption of opium, laudanum or morphine, cocaine, ether, chloral hydrate, etc.:

1. The stomach should be washed out, insofar as is feasible.
2. Artificial respiration should be instituted.
3. Hypodermic injections of oxygen gas should be given.
4. Strong coffee or tea, or caffeine, should be administered by the oral, rectal or hypodermic route.
5. If necessary because of a scanty output of urine, an injection of .200 to 500 c.c. (6 to 16 ounces) of saline solution, or better, glucose solution, should be given.

(See also the section on *Intoxications*.)

CONSTIPATION.

[Constipatio, *from constipare,*
to squeeze together.]

By LÉON MEUNIER, M.D.

Intestinal atony may be manifested either by simple constipation, by alternations of constipation and diarrhea, by distention of the bowel or defensive spasms, or by the presence of mucus or mucous admixtures in the stools as a result of this defensive reaction. From the exclusive standpoint of treatment, however, with which we are now dealing, it is the initial atony that must be combated.

Constipation may be divided into right-sided and left-sided constipation, according as the fecal stasis occurs in the right or left half of the large intestine.

Left-sided constipation is the ordinary form, free of any marked complication. Right-sided constipation, which is less common, is accompanied by general disturbances and frequently a neurasthenic condition. Its effects are felt, according to Anglo-Saxon writers, by almost all organs of the body. Without going so far as to accept the pathologic deductions of Sir Arbuthnot Lane, there is a tendency, in accord with the views of this author, to ascribe it to mechanical and inflammatory factors with the formation of bands which result in enlargement and elongation of the colon.

In any sort of constipation, there are a few general principles that must be applied in the management of the case.

What Not To Do.—Above all, in dealing with a case of established constipation, the physician should know better than to plunge *a priori* into the time-honored armamentarium of laxative drugs and preparations. Long before consulting him the patient has already used all the commercial products which, under various labels and in varied forms, simmer down to a very few active substances, such as aloe, phenolphthalein, senna, etc. (see *Cathartics*).

The thing to realize is that in the majority of cases the bowel can and must be trained back to activity, and it is the physician's duty to attempt this training.

By what means?

Psychotherapy.—This is where the physician should know how to bring into play his power as a psychotherapist. To the patient who insists that for years he has been able to have bowel movements only by plying himself with drugs and enemas the physician must know how to reply that any person's bowel can be trained back to activity provided that person will himself supply the necessary amount of patience, will-power, and especially, confidence.

He must be able to demonstrate to the patient that the use of laxatives in constipation is only a makeshift which cannot but lead finally to complete failure of bowel function and that the only way to avoid this result is to discard them immediately and for good.

Diet.—The diet, both quantitatively and qualitatively, plays an important part in the treatment of the bowel.

Quantitatively, the physician must react against the patient's tendency to reduce his diet more and more. Along a simple line of reasoning, many constipated patients are likely to say: "I don't dare to eat much, because as my bowel is so sluggish, I am afraid to get poisoned!"

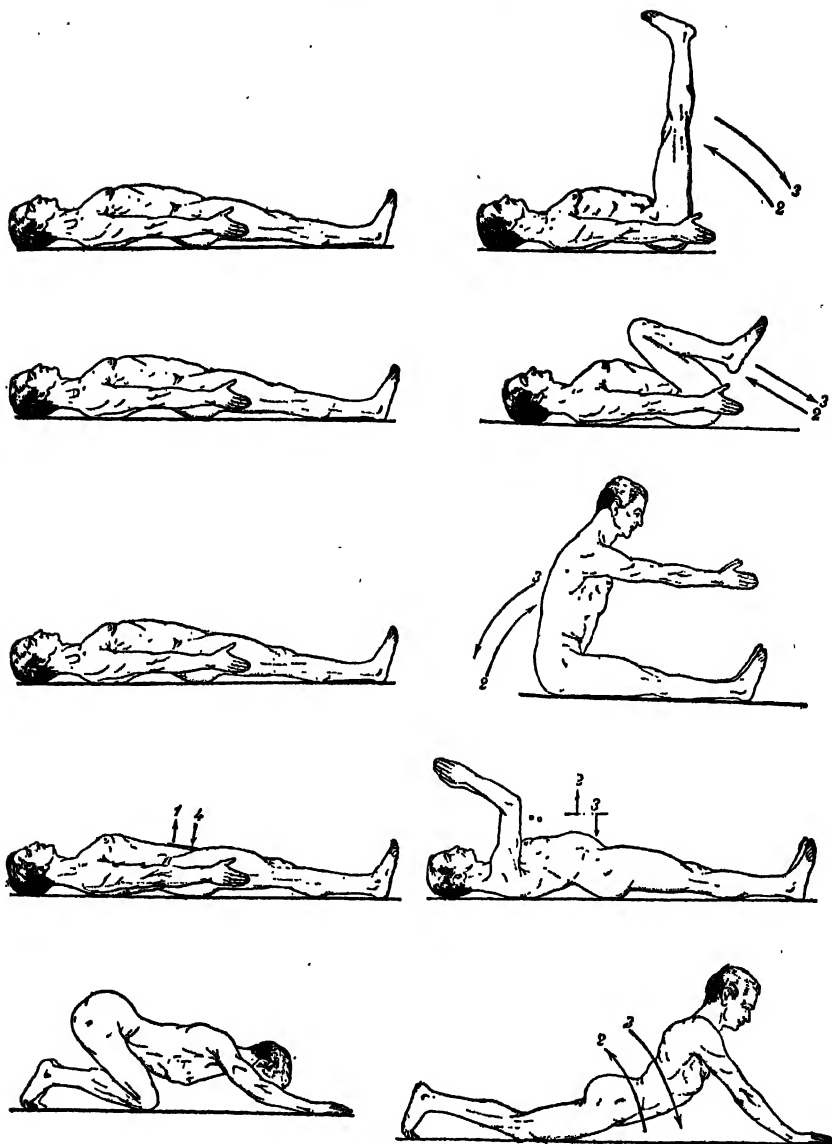
The patient must, on the contrary, be shown that he must gradually increase his intake of food, and eat a normal amount, or even eat too much.

His attention should be called to the fact that a heavy eater is never constipated. Indeed, to build up the intestinal muscle it is necessary to take a sufficient amount of food.

Again, it is a well-known physiological fact that the peristaltic contractions of the intestine can be excited only if the intestine contains a sufficient amount of food residue.

Qualitatively, to supply this physiologic need, the patient should take foods which will leave residue in the gastro-intestinal tract. Fruits and green vegetables, which yield the indispensable cellulose débris, should accordingly form the main foundation of the diet. It should be recalled, however, that these foods that yield residue in the stomach which is favorable to intestinal peristalsis retard the evacuation of the stomach. It is, therefore, well to recommend that the fruit be taken preferably in the morning on an empty stomach.

Regularity of Defecation.—Regularity of defecation is one of the major factors in training the bowel to activity. The patient should go to the toilet regularly at a certain time. The best time is following a meal, *e.g.*, breakfast. At this time an attempt at defecation should be made just as though positive results were expected. In the event of failure, a similar attempt should be made the next day at the same



Figs. 228 to 237.

time; success depends on the persistence with which these attempts are regularly made.

It is singular to note how little this simple rule, mention of which would seem superfluous, is actually followed. While one sees every one appearing at the table to eat at definite times settled by universal

usage, the utmost degree of irregularity is found to obtain as regards the time of going to stool. And yet, gastric secretion and the peristaltic contractions of the intestine are subject to the same physiologic law.

How to Induce Intestinal Contractions.—Experience and observation show that the bowel always tends to execute peristaltic contractions at a certain time each day.

To excite and initiate these contractions various measures may be employed:

1. The drinking of a tumblerful of cold water in the morning on awakening.

2. The additional ingestion of some fruit in season, or of a few dried figs or of a tablespoonful of preserves, to be taken with the glass of water.

3. Carrying out certain exercises of the abdominal muscles (as illustrated in the accompanying cut) or simply walking on all fours for a short distance.

4. The taking of a rather full breakfast, including some whole wheat bread, buttered bread, or bread and honey, and milk products.

5. The addition to the other meals of articles yielding much residue, *viz.*, green vegetables and fruits.

In short, with a somewhat modified diet, great regularity in going to the toilet, and a few further instructions as to diet and hygiene, any patient will be able to restore his bowel to proper activity provided he is able to add the qualities of *confidence* and *persistence*.

Adjunct Measures.

The measures already mentioned must prove successful; at least the physician must implant this conviction in the patient, for nothing will destroy conviction like the idea of possible failure. Assuming, however, that the procedure actually has failed, let us see what measures must be absolutely banned:

This applies to the irritant laxatives taken in a small bulk and which are as antiphiologic as possible. Nearly all the commercial preparations belong in this group for, as already stated, analysis of the various preparations always shows the same active substances, *viz.*, aloes, phenolphthalein, podophyllin, etc.

All forms of copious intestinal irrigation, which have really been abused, should also be banned. It should be realized that enemas of one or two liters of fluid, injected regularly every day, ultimately distend the intestinal muscle and thereby actually aggravate the bowel atony originally present.

Means Which May be Used.—The means used should be as similar as possible to those employed by nature to excite peristaltic contractions, and should consist, therefore, of agents which produce the same effects as actual food residue. A few of these agents may here be recalled.

Sifted linseed.

Agar-agar.

Psyllium (fleeseed).

Powdered charcoal.

Liquid petrolatum.

Olive oil.

Let it be noted that these agents are best taken before a meal, or on an empty stomach, if retardation of the passage of food through the gastro-intestinal tract is to be avoided.

Small Enemas.—The only small enema which appears to me to serve a useful purpose in relation to the intestinal mucosa is the small oil enema, which acts, as it were, as a lubricant to the mucosa and exerts a physical effect, assisting the fecal material to slip along the bowel.

I prescribe it as follows:

At night a small enema of 2 to 3 tablespoonfuls of oil and 2 to 3 tablespoonfuls of lime water, well beaten together, is taken. The resulting mixture recalls the liniment, carron oil, known of old. It presents for the intestine the following advantages: It constitutes an unctuous preparation which adheres perfectly to the mucous membrane and yields an alkaline mixture corresponding physiologically to the likewise alkaline medium of the large intestine. This enema is to be taken at night with a syringe provided with a large, curved nozzle, and is to be retained all night.

Large Enemas.—The small enema is disadvantageous in that it fills only a part of the left side of the large bowel. In the presence of right-sided constipation, it is important to reach the whole of the large intestine; it is in these especially that I recommend the large enema. Its action can be completed by having the patient take large enemas of $\frac{1}{2}$ to $\frac{3}{4}$ liter (16 to 24 fluidounces) of the foregoing mixture (equal parts of oil and lime water).

This enema should be given with a syringe with a large nozzle (*e.g.*, a tin syringe of the veterinary type,—which carries us back almost to Molière's time).

This enema may be retained one-half hour, one hour, or often even longer, according to the intestinal tolerance of the patient. During this time the abdominal wall may be kneaded and faradized, producing in the large intestine a species of lubricating massage which

has always been of great service to me in the most intractable cases of constipation.

Surgical Treatment.—Surgical treatment is now in favor. Yet it should be considered only as an exceptional method, to be resorted to when all other measures fail and provided X-ray examination shows the colon *elongated* and *distended* in an altogether abnormal fashion.

The procedures advocated are as follows:

Fixation of the large bowel, and in particular of the hepatic flexure.

Anastomosis of the ileum and sigmoid flexure, with exclusion of the cecum (Lardennois, Okinczyc, Pierre Duval).

Hemicolectomy (if the sigmoid is unaffected) or total colectomy (Lane, Pauchet).

These colectomies may be carried out in two stages, with iléo-rectal drainage.

Lane recommends, before conclusion of the operation, the production of an artificial ascites by intraperitoneal injection of 3 liters of salt solution, to prevent adhesions.

CONVULSIONS (CONVULSIVE SEIZURES).

[Convulsio, *from* convellere, *to shake*;
sudden and involuntary contractions
of the muscles.]

For practical purposes, a distinction must be made between the common and often relatively insignificant **infantile convulsions** and the **convulsions of adults**, much less common and generally much more serious.

INFANTILE CONVULSIONS.—Symptomatic treatment should, as always, give way to treatment of the underlying cause where the latter can be discovered and effectively treated. A good vermifuge in a patient whose reflex convulsive seizures are due to the presence of ascarides in the intestine; specific treatment in syphilitic meningitis; starvation and a purge in gastro-intestinal occlusion or infection; anodyne dental balsam or the administration of an analgesic drug in teething, etc., constitute, on the whole, the best forms of treatment for convulsions in children.

If the practitioner is in doubt, or cannot find any cause, or is dealing with convulsive seizures of neurotic or constitutional (spasmophilic) origin, or the cause of which is merely an intangible one, he will have to endeavor to treat the convulsions directly.

For this purpose the following somewhat empiric measures are available:

1. HYPNO-ANESTHETIC DRUGS:

(a) *Enemas of chloral hydrate*, about 0.2 gram (3 grains) to the year of age in 30 to 60 c.c. (1 to 2 ounces) of hot milk or in 60 c.c. of warm water with $\frac{1}{2}$ to 1 egg-yolk, beaten up.

(b) *Inhalation of chloroform* in divided, cautious amounts, *i.e.*, in drops on a gauze compress.

2. ANALGESIC, NERVE-DEPRESSANT DRUGS:

(a) *Antipyrin*, 0.2 gram (3 grains) to the year of age in an enema of 30 c.c. (1 ounce) of warm water (with or without alkali in small amount).

(b) *Bromides*, 0.5 to 0.6 ($7\frac{1}{2}$ to 9 grains) to the year of age in enemas or solutions. These are of known efficacy, but act much more slowly, and present none of the features of an emergency remedy. A salt-free diet should be combined with their use.

(c) *Luminal* (phenobarbital), 0.03 gram ($\frac{1}{2}$ grain) below six months; dose to be cautiously increased, if need be.

3. WARM BATHS:

Baths at 34 to 36° C. (94 to 97.5° F.), continued for ten to twenty minutes or longer, with cold applications over the head and back of the neck, especially indicated in convulsions occurring at the onset of ordinary febrile diseases.

4. BLOOD-LETTING, in the form of wet cups over the kidneys or liver, leeching behind the ears, or actual venesection, in the cases in which venous stasis, particularly in the brain, seems evident.

5. LUMBAR PUNCTURE, aside from its great diagnostic value, sometimes exerts a most favorable influence on convulsions when they are wholly or partly dependent on cerebrospinal hypertension.

6. In spasmophilia, one might try subcutaneous or intramuscular INJECTIONS OF MAGNESIUM SULPHATE—2 c.c. (30 minims) of a 20 per cent. solution three times a day. More concentrated solutions cause local pain and entail a risk of necrosis.

7. Pressure on both carotid arteries, a procedure advocated by Trousseau, is not attended with much success.

* * *

Typical treatment of a case of infantile convulsions, as described by Comby:

"1. Loosen the clothing about the neck, give the child air, open the window, and immerse the child in a starch or linden bath, or wrap him up in a cold wet sheet.

"2. Give an evacuant enema (one tablespoonful of glycerin or castor oil in 100 to 150 c.c.—3 to 5 ounces—of warm water).

"3. Then give one of the following enemas, to be retained and renewed, if need be, every two or three hours:

℞ Antipyrinæ	0.25 gram (gr. iv);
Aquæ bulliatæ	40 c.c. (f3x).—S.

Or,

℞ Potassii bromidi	0.2 gram (gr. iij);
Chloralis hydratis	0.1 gram (gr. iss);
Aquæ bulliatæ	150 c.c. (f3v).—S.

"4. In severe cases, inhalations of ether or chloroform from the corner of a handkerchief.

"5. Between the seizures give three to six teaspoonfuls a day, according to age, of the following:

℞ Potassii bromidi	2	grams (3ss);
Chloralis hydratis	1	gram (gr. xv);
Extracti hyoscyami	0.1	gram (gr. iss);
Syrupi codeinæ (N. F. IV.)	7.5	c.c. (f3ij);
Syrupi aurantii	15	c.c. (f3ss);
Aquæ destillatæ	80	c.c. (f3xxiss).—M."

CONVULSIONS IN ADULTS.—The treatment is much the same as in the convulsions of childhood.

The **convulsive element** should be combatted with the same agencies: *Chloral hydrate, chloroform, bromides, antipyrin*, blood-letting, hydrotherapy, and lumbar puncture. Chloral and bromides can and should be used very freely in these cases.

During the actual convulsion, the treatment reduces itself to:

Placing the patient in a position which will avoid injuries and accidents.

Loosening all clothing about his neck, chest and waist.

Having him inhale, if possible, a little chloroform.

Far more than in the child, however, it is the **causal factor** which is of importance in these cases:

In *tetanus*, antitetanic serum in large doses and nerve depressants in extra large amounts—chloral hydrate (8 to 12 grams—2 to 3 drams—or even more), bromides—together with isolation, silence and darkness.

In *strychnine poisoning*, chloral hydrate and bromides in large doses [also chloroform inhalations at first and later ether].

The above conditions are, however, rather exceptional. The following causes of convulsions, on the other hand, are very frequently met with in practice:

Puerperal eclampsia: This requires a milk diet, venesection, chloroform and chloral hydrate, and intravenous injections of 300 to 800 c.c. (10 to 25 ounces) of a 10 per cent. solution of glucose in physiologic salt solution.

Uremia: A suitable chloride-free diet, low in nitrogen (milk or fruit diet), repeated bleeding, repeated purgation, diuretics, and injections of 10 per cent. glucose-saline solution.

Epilepsy: Bromides in sufficient dosage and various adjunct remedies in accordance with the variety of clinical disturbance present, epilepsy being etiologically an ill-defined condition. (See *Epilepsy*.)

Diabetes mellitus: Treatment for diabetes.

Alcoholism: A detoxication cure, if necessary combined with hypnotic and anesthetic agents; the use of opium preparations may be temporarily indicated, especially in the presence of delirium tremens.

Syphilis should always be kept in mind and requires the customary specific treatment.

COUGH.

The complexity of the mechanism of **cough** and the multiplicity of the centripetal paths which may conduct the causal stimulus lead at once to the suspicion that there can be no "specific" treatment of cough.

Again, the cough which leads to expectoration and the removal of obstructing material from the bronchial tubes is a *useful cough* which should be let alone or, at the most, moderated; this is the case in most coughs of respiratory origin. On the other hand, *reflex cough* is generally a *useless* or even harmful manifestation which should be resolutely combatted.

Logically, the objects sought in treatment should be: 1. To reduce the sensitiveness of the mucous membrane from which the cough reflex originates. 2. To lower the sensitiveness of the nerve center concerned in the reflex. 3. To influence the efferent pathways, if possible. 4. To endeavor to procure inhibition of the cough through the influence of the cerebrum on the bulbar center; *e.g.*, by suggestion.

The first of these indications, which consists in **influencing the mucous or serous membrane from which the reflex originates**, generally merges with the treatment of the cause. Fulfilling this indication requires the greatest amount of clinical sense; it can be met only after an exact diagnosis has been made. In a patient harboring worms, a vermifuge will be all-sufficient; in a dyspeptic, a proper diet will prove the best medicine. When the mucous membrane is accessible to external applications, a local anesthetic will often work wonders; thus, in two cases of unusually obstinate cough which had resisted all drug treatment, I obtained practically instant results by momentary introduction into the nasal cavities of cotton dipped in a 1 per cent. solution of cocaine hydrochloride. In cough of gastric origin, a liquid preparation containing chloroform and cocaine will act in the same way.

The indication which consists in **reducing the reflex irritability of the bulbar center** is generally met by opium and its derivatives; opium is the active agent in countless preparations, official and other, intended for the treatment of cough. It is often powerless, if not, indeed, harmful, in the so-called reflex coughs, except in cough of pleural origin. I have seen a patient with paroxysmal cough of nasopharyngeal origin in whom a few centigrams of extract of opium

would bring on paroxysms so regularly as to preclude all idea of a mere coincidence. It is no longer necessary to emphasize the pronounced value of the bromides in these cases. The so-called M \acute{e} glin's pills have also frequently proven successful, in my experience:

℞ Extracti hyoscyami,
 Extracti valerianæ,
 Zinci oxidiāā 0.05 gram (gr. $\frac{1}{4}$).
 Ft. pil. No. i. Da tal. No. xxx.
 Sig.: One pill three times daily.

The third indication, that of influencing the efferent paths, is more open to discussion from the physiologic standpoint, but experience indicates that often two small blisters along the course of the phrenic nerve, the one in the cervical region, above the clavicle, and the other at the lower rib margin, over the "phrenic point," exert a most favorable influence in certain spasmodic coughs, especially those associated with hyperesthesia along the course of the phrenic nerve.

Lastly, the central inhibitory action is exerted through suggestion in the waking state, the physician declaiming to the patient on the uselessness of his cough and convincing him of the possibility and necessity of his stopping it through the act of his will. The following story, related by Troisier, is typical in this connection: "While visiting at Falkenstein, I was seated at the dinner table and had been given the place of honor, next to Dr. Dettweiler; not far from us was seated a consumptive colleague. He was coughing and coughing, continuously. Dettweiler whispered to me: 'You see that doctor who is coughing so. Well, after dinner I shall tell him he must either stop his coughing or eat by himself, for he does not have to cough.' The same evening, at supper, our unfortunate colleague was seated at his usual place, but did not cough once during the entire meal."

A condensed, but comprehensive account of the treatment of cough from the standpoint of pathologic physiology is presented in the annexed diagram.

* * *

The most commonly used and most effective **cough sedatives** are the *opiates* (opium and its derivatives—morphine, codeine, ethylmorphine hydrochloride, diacetylmorphine, etc.; see Part I: *Opium*). One should be particularly cautious in their use in children, old persons, and hepatic and renal cases. They may be combined with various other sedatives, of which the most commonly used are *aconite*, *belladonna*, *hyoscyamus*, cherry-laurel water, bromoform, etc. The first three of these drugs are often prescribed in the form of tinctures, less frequently in the form of extracts. Follow-

REFLEX COUGH CENTER IN THE MEDULLA.

Agents inhibiting cough:

Quinine and its derivatives.
Aconite.
Cherry-laurel water (HCN).
Bromides. Antipyrin. Valerian.
Bromoform. Chloroform.
Inhibitory suggestion.

EFFERENT, MOTOR PATHS.

AFFERENT, CRANIAL SENSORY AND VISCERAL PATHS.

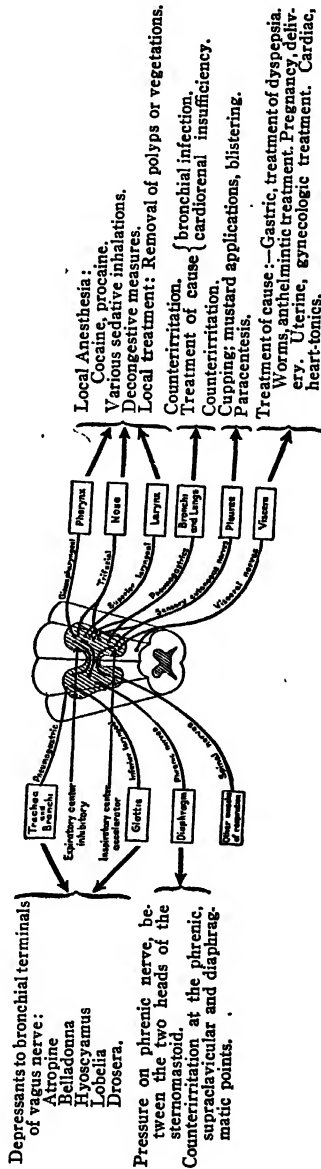


Fig. 238.—Cough (pathogenesis and treatment).

ing are the *maximal* doses of these preparations recognized in the French Codex. [The doses apply also to the U. S. P. preparations, although no official list of maximum doses is included in the U. S. Pharmacopœia. For convenience, the approximate equivalents in minims and grains have been added.]

		MAXIMAL SINGLE DOSE.	MAXIMAL AMOUNT IN 24 HOURS.
Tincture of aconite (10 per cent.)	0.5	gram (10 minims)	1.5 grams (30 minims).
Tincture of belladonna (10 per cent.)	1	gram (17 minims)	4 grams (70 minims).
Tincture of hyoscyamus (10 per cent.)	1	gram (17 minims)	4 grams (70 minims).
Extract of aconite	0.03	gram ($\frac{1}{2}$ grain)	0.1 gram ($1\frac{1}{2}$ grains).
Extract of belladonna	0.03	gram ($\frac{1}{2}$ grain)	0.1 gram ($1\frac{1}{2}$ grains).
Extract of hyoscyamus	0.1	gram ($1\frac{1}{2}$ grains)	0.3 gram (5 grains).

The above doses are the maximal amounts for adults; doses for children may be calculated according to one of the various rules in vogue for this purpose (see Part I: *Dosage in Children*).

Cherry-laurel water is required to contain 0.1 per cent. of hydrocyanic acid; the maximal doses specified in the Codex are 2 grams (32 minims), single, and 10 grams (160 minims), daily. [Cherry-laurel water is not recognized in the U. S. P., but is recognized in the B. P.; average dose, 2 to 8 c.c. (32 to 128 minims) of the 0.1 per cent. preparation.]

Bromoform may be used in average amounts of 0.1 to 0.5 c.c. ($1\frac{1}{2}$ to 8 minims) a day. It is almost insoluble in water; to obtain a satisfactory liquid preparation of bromoform, a little alcohol or chloroform must be added, or the drug incorporated in an oily linctus by the addition of oil of sweet almond and acacia.

With the above ingredients there may be formulated many **cough sedative preparations**, of which the following represent five different types:

DROPS:

- R.** *Æthylmorphinæ hydrochloridi* 0.1 gram (gr. iss);
Tincturæ aconiti 2.5 c.c. (℥xl);
Tincturæ hyoscyami 4.5 c.c. (℥lxx);
Aquæ laurocerasi q. s. ad 10 c.c. (f3iiss).
M. Sig.: Thirty to sixty drops [not minims] three or four times a day in a cupful of fluid.

Or, more simply:

- R.** *Tincturæ aconiti* 6 c.c. (℥c);
Tincturæ hyoscyami 5.5 c.c. (℥xc).
M. Sig.: Twenty to thirty drops [not minims] three times a day.

GRANULES:

R. Extracti aconiti	0.01 gram (gr. $\frac{1}{6}$);
Extracti droseræ	0.04 gram (gr. $\frac{1}{8}$);
Glycyrrhizæ pulveris	q. s.

Ft. granul. No. i. Da tal. No. xl.

Sig.: Two to six granules a day before meals.

SEDATIVE SYRUP:

R. Tincturæ aconiti	2.5 c.c.	(m. xl);
Aquæ laurocerasi	8 c.c.	(f3ij);
Sodii benzoatis	8 grams	(3ij);
Syrupi codeinæ (N. F. IV),		
Syrupi senegæ,		
Syrupi tolu	āā 37.5 c.c.	(f3x).

M. Sig.: Four tablespoonfuls a day, between meals, in a cupful of pectoral infusion.

SEDATIVE MIXTURE:

Extracti opii (N. F.)	0.05 gram	(gr. $\frac{3}{4}$);
Tincturæ aconiti	0.3 c.c.	(m. v);
Aquæ laurocerasi	5 c.c.	(m. lxxx);
Acaciæ	8 grams	(3ij);
Syrupi aurantii florum	20 c.c.	(f3v);
Aquæ destillatæ	125 c.c.	(f3iv).

M. Sig.: One tablespoonful at a dose.

Following is an oily bromoform linctus, deemed serviceable by Marfan in children:

OILY BROMOFORM LINCTUS:

R. Bromoformi	2.5 c.c.	(m. xl);
Olei amygdalæ expressi,		
Syrupi aurantii florum	āā 30 c.c.	(f3j);
Acaciæ pulveris	30 grams	(3j);
Aquæ laurocerasi	10 c.c.	(f3iiss);
Aquæ destillatæ	q. s. ad 300 c.c.	(f3x).

M. Sig.: Three teaspoonfuls, dessertspoonfuls or tablespoonfuls a day in children one, two or three years old, respectively.

Æthone, or ethyl orthoformate [$C_7 H_{16} O_3$], is an antispasmodic which sometimes acts even in whooping-cough and is often useful in refractory cough in doses ranging from 8 to 10 drops in infants up to one year of age to 30 to 50 drops in adults; these doses are taken between meals in sweetened water five or six times or more in the twenty-four hours.

The formulas above given may be variously modified either by changing the relative amounts of the ingredients or by the addition of various other drugs, *e.g.*, antipyretics and sedatives, such as antipyrin; expectorants, such as senega, sodium benzoate or sulphurated antimony, or heart remedies, such as digitalis, caffeine, alcohol, sparteine, etc.

Following are some formulas intended for obstinate chronic cough, as in chronic bronchitis, tuberculosis, etc.:

PILLS:

- (1) \mathcal{R} Extracti belladonnæ 0.005 gram (gr. $\frac{1}{12}$);
 Extracti opii (N. F.) 0.01 gram (gr. $\frac{1}{6}$);
 Extracti hyoscyami 0.03 gram (gr. ss).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: Three to five pills in 24 hours.

- (2) \mathcal{R} \mathcal{A} ethylmorphinæ hydrochloridi 0.01 gram (gr. $\frac{1}{6}$);
 Extracti hyoscyami 0.03 gram (gr. ss)
 Sodii benzoatis 0.05 gram (gr. $\frac{3}{4}$);
 Terpini hydratis 0.1 gram (gr. iss);
 Tolu q. s.

Ft. pil. No. i. Da tal. No. xxx.

Sig.: Three to five pills in 24 hours.

- (3) \mathcal{R} Pulveris ipecacuanhæ et opii,
 Extracti valerianæ $\bar{a}\bar{a}$ 0.1 gram (gr. iss);
 Tolu q. s.

Ft. pil. No. i. Da tal. No. xxx.

Sig.: Three to five pills in 24 hours.

DROPS:

- (1) \mathcal{R} Diacetylmorphinæ hydrochloridi 0.1 gram (gr. iss);
 Aquæ laurocerasi,
 Aquæ chloroformi $\bar{a}\bar{a}$ 5 c.c. ($\mathfrak{m}\text{xxx}$).

M. Sig.: Ten to twenty drops one to three times in 24 hours.

- (2) \mathcal{R} Tincturæ belladonnæ,
 Tincturæ droseræ,
 Tincturæ grindeliæ,
 Tincturæ opii camphoratæ $\bar{a}\bar{a}$ 2 c.c. ($\mathfrak{f}\text{3ss}$);
 Tincturæ aconiti 1 c.c. ($\mathfrak{m}\text{xv}$).

M. Sig.: Ten to twenty drops three to five times a day.

MIXTURES:

- (1) \mathcal{R} Tincturæ belladonnæ 5.5 c.c. ($\mathfrak{f}\text{3iss}$);
 Tincturæ aconiti 2.5 c.c. ($\mathfrak{m}\text{x1}$);
 Aquæ laurocerasi 10 c.c. ($\mathfrak{f}\text{3iiss}$);
 Syrupi codeinæ (N. F. IV) 60 c.c. ($\mathfrak{f}\text{3ij}$);
 Syrupi senegæ,
 Syrupi tolu $\bar{a}\bar{a}$ 37.5 c.c. ($\mathfrak{f}\text{3x}$).

M. Sig.: Three or four tablespoonfuls in 24 hours.

- (2) \mathcal{R} Extracti opii (N. F.) 0.1 gram (gr. iss);
 Aquæ laurocerasi 10 c.c. ($\mathfrak{f}\text{3iiss}$);
 Aquæ tilix 140 c.c. ($\mathfrak{f}\text{3v}$).

M. Sig.: Four to six tablespoonfuls in 24 hours.

(3) \mathcal{R} Mentholis	4	grams	($\mathfrak{z}\mathfrak{j}$);
Alcoholis	12	c.c.	($\mathfrak{f}\mathfrak{z}\mathfrak{i}\mathfrak{i}\mathfrak{j}$);
Bromoformi	0.35	c.c.	($\mathfrak{m}\mathfrak{v}\mathfrak{j}$);
Tincturæ aconiti	2.5	c.c.	($\mathfrak{m}\mathfrak{x}\mathfrak{l}$);
Syrupi codeinæ (N. F. IV)	60	c.c.	($\mathfrak{f}\mathfrak{z}\mathfrak{i}\mathfrak{j}$);
Syrupi tolu	90	c.c.	($\mathfrak{f}\mathfrak{z}\mathfrak{i}\mathfrak{i}\mathfrak{j}$).

M. Sig.: Three to six tablespoonfuls in 24 hours.

Following are some formulas similar to certain unofficial preparations widely used in France:

\mathcal{R} Codeinæ	0.3	gram	(gr. v);
Alcoholis (60 per cent.)	30	c.c.	($\mathfrak{f}\mathfrak{z}\mathfrak{i}$);
Syrupi	q. s. ad 300	c.c.	($\mathfrak{f}\mathfrak{z}\mathfrak{x}$).

M. Sig.: One to six tablespoonfuls in 24 hours.

\mathcal{R} Lactucarii	1	gram	(gr. xv);
Alcoholis (80 per cent.)	3	c.c.	($\mathfrak{m}\mathfrak{x}\mathfrak{l}\mathfrak{v}\mathfrak{i}\mathfrak{i}\mathfrak{i}$);
Extracti opii (N. F.)	0.1	gram	(gr. iss);
Aquæ aurantii florum	20	c.c.	($\mathfrak{f}\mathfrak{z}\mathfrak{v}$);
Syrupi aurantii florum	60	c.c.	($\mathfrak{f}\mathfrak{z}\mathfrak{i}\mathfrak{j}$);
Syrupi	q. s. ad 225	c.c.	($\mathfrak{f}\mathfrak{z}\mathfrak{v}\mathfrak{i}\mathfrak{i}\mathfrak{s}\mathfrak{s}$).

M. Sig.: Two to four tablespoonfuls a day.

It may not be without practical interest to mention certain obstinate forms of cough which are of considerable clinical importance and require rather special forms of treatment. These will now be reviewed briefly.

Chronic rhinitis of the hypertrophic type is a frequent cause of paroxysmal cough and should be treated by nasal douching with warmed physiologic salt solution, by means of pomades containing eucalyptol, resorcinol or gomenol, and especially by cauterizations with the galvanocautery. Inhalations of ozone gave excellent results in some cases under my observation.

The **nasopharynx** is the commonest seat of affections causing obstinate chronic cough.

An *excessively long uvula* should be reduced with the galvanic loop.

Follicular tonsillitis may be treated by discission, the crypts being opened up, treated with iodine and cauterized with 10 per cent. zinc chloride solution.

In **chronic catarrhal pharyngitis** the following measures may be employed:

Inhalations of benzoin or eucalyptus—one teaspoonful of the tincture in 200 cubic centimeters (6 ounces) of boiling water.

Spraying with similar preparations.

Irrigations of the pharynx with physiologic salt solution or a 1 or 2 per cent. alkaline solution.

Applications of 1 per cent. iodine or iodine and iodidé in glycerin, or with a resorcinol preparation, in the atrophic forms.

Complete *interdiction of tobacco and alcohol*.

Adenoid vegetations should be dealt with, with the curette, if the adenoiditis has subsided.

If inflammation is still present, an attempt at nasal antisepsis may be made by the use of inhalations, irrigations of the pharynx, or nasal ointments or oils containing 1 per cent. of phenol or 5 per cent. of resorcinol, eucalyptol or gomenol.

Congestive enlargement of the lingual tonsil should be treated:

By remote revulsive procedures, such as hot compresses over the front of the neck, hot foot-baths and sleeping with the head high.

By local applications of 2 per cent. resorcinol or 1 per cent. cocaine in glycerin.

By local cauterizations with the galvanocautery or with 5 per cent. zinc chloride (with great care, however, and remembering the risk of edema of the glottis).

The **larynx**, likewise often the source of cough, calls for the use of: *Aconite* or *cherry-laurel water* as sedatives.

Sedative inhalations of benzoin, eucalyptus or poppy heads.

Sometimes local applications of 5 per cent. zinc chloride solution or $3\frac{1}{2}$ per cent. silver nitrate solution.

Particularly should the physician not forget to interdict tobacco, alcohol and unnecessary conversation.

The **trachea**, aside from the procedures already alluded to, can sometimes be favorably influenced by *intratracheal instillations* of menthol, eucalyptol or gomenol.

Tracheobronchial glandular enlargement may be either of ordinary, non-specific causation or of tuberculous or syphilitic origin.

In the latter event, antisiphilitic treatment is indicated.

In the first two instances, general tonic treatment (iodotannic preparations, arsenicals, remineralizing agents, and saline or sea-shore "cures") is required, in conjunction with climatic treatment, local counterirritation and the local treatment of nasopharyngeal infections.

The paroxysmal cough of **whooping-cough** calls mainly for the preparations of belladonna or bromoform. Inhalations of *ozone* sometimes reduce the intensity and severity of the coughing-spells.

Pleuritic cough, in the presence of *pleuritis sicca*, will sometimes be allayed by local counterirritation, as by mustard applications and small or large blisters. The cough that sometimes follows an unduly rapid or

complete tapping of the pleura may require a hypodermic injection of morphine.

Emetic cough in tuberculosis.—A special mention of the obstinate and harmful "emetic cough" of consumptives is in order. The emetic cough is due to a reflex cycle originating in the gastric mucous membrane, the cough being set off by contact of the food with this membrane. This cough, by reason of its inveteracy and the vomiting it induces, is one of the most detrimental accompaniments of the disease.

Clinical observation shows that the antispasmodic, anesthetic drug given to relieve the symptom must be administered just when the food is being taken or immediately after.

The ordinary antemetics, such as ice, chloroform water, cocaine, morphine and lime water sometimes do some good. Menthol gives the most constant results. One might prescribe:

R ^x Mentholis	0.2 gram	(gr. iij);
Acaciæ	8 grams	(5ij);
Syrupi aurantii florum	20 c.c.	(f5v);
Aquæ destillatæ	125 c.c.	(f3iv). —M.

At first, one tablespoonful of this preparation should be taken after each meal. The dose is then gradually diminished to complete cessation.

Bismuth certainly gives results less favorable than does menthol.

All medication by the mouth should be stopped; the meals should be small and taken at regular intervals of two or three hours, and should consist of easily digested food.

Where the cause of cough is in the least degree obscure, the physician should always think of:

The uterus in women:

Uterine displacement to be corrected.

Metritis to be treated.

Pregnancy to be supervised.

Intestinal parasites in children: Calomel and santonin.

Neurosis, requiring suitable psychotherapeutic treatment, in individuals with tics, obsessions, scruples or hysteria.

DIARRHEA.

[*διαπερῖν, to flow through.*]

By LÉON MEUNIER, M.D.

In the case of an adult suffering from **diarrhea**, there is a plan of treatment which is as commonly followed as it is easy to carry out, *viz.*, that of prescribing *a priori* all the time-honored "anti-diarrheic" drugs, bismuth, opium, krameria, etc.

But in so doing, one often makes a serious therapeutic mistake, and it can be confidently asserted that this classic plan of treatment should be confined to a minority of the cases.

Varieties of Diarrhea Which Should be Left Alone.—These comprise all the varieties which represent merely a defensive measure on the part of the organism. They are met with in many different disorders: Uremia, gout, diabetes mellitus, heart disease, etc.

Varieties of Diarrhea Which Should be Further Promoted.—These include all the toxic, alimentary forms of diarrhea, such as those resulting from poisoning by game or cream-puffs, from indigestion due to overeating, and from fat intolerance due to insufficiency of the hepatic and pancreatic functions.

This expulsive type of diarrhea should be assisted by giving a mild purge, intended to sweep out mechanically the cause of the disturbance.

Varieties of Diarrhea Requiring a Specific Line of Treatment.—These consist of all the forms of diarrhea of bacterial or parasitic origin. Obviously, an exact diagnosis, based mainly on bacteriologic examination of the stools, is a necessary foundation for such specific treatment. Only a few typical instances will be enumerated:

Diarrhea of amebic dysentery.—Emetine, arsphenamin.

Diarrhea of bacillary dysentery.—Dysentery serum, intestinal irrigations with silver nitrate.

Dysenteriform diarrhea due to flagellates.—Bismuth subsalicylate, arsphenamin.

Diarrhea of typhoid fever.—Constitutional treatment.

Diarrhea of consumptives.—Constitutional treatment.

Varieties of Diarrhea Requiring Mainly Psychotherapeutic Treatment.—It is unnecessary to recall the influence of emotion on the bowel, exemplified in the well-known diarrhea of recruits.

The *enterorrhea of exophthalmic goiter* serves almost as an experimental proof of the occurrence of a neuropathic diarrheal flux.

This nervous form of diarrhea may come on even in a person on a rigid diet, as a result of overwork, a nervous shock, or mere anxiety.

A typical account given me by one of these nervous subjects was that he was always seized with obstinate diarrhea when he travelled in a railway car not provided with a toilet. Leaving town one day in a car apparently adapted to the needs of his case, he remained in complete mental and intestinal comfort until, his journey being two-thirds completed, he happened to push open the door of the toilet and noticed that war conditions had resulted in its being placed out of commission. He was thereupon seized with such intestinal distress that the last third of the trip took place under most dramatic conditions.

Diarrhea Associated with Evidences of Constipation.—There is one form of diarrhea upon which, it seems, stress should be laid. This is the diarrhea occurring in attacks, with alternating periods of constipation. These are, in short, cases of pseudo-diarrhea, constipation being the initial cause. It is this variety of diarrhea which, on account of the prolonged contact of the feces with the mucous membrane, causes the production of defensive secretions which, according as they appear in the form of a liquid flux, or of dried mucus suggesting pieces of skin or thongs, are described at such length in learned disquisitions under the terms enteritis, mucous colitis, or membranous or mucomembranous rectocolitis.

In brief, the treatment of all these affections resolves itself into the institution of a suitable and rational treatment for intestinal atony, and for this the reader is referred to the section on *Constipation*.

With the foregoing exclusions made, let us review the measures available for the treatment of a case of **ordinary diarrhea**.

Rest of the Intestine.—In the first place the bowel must be placed at rest, and, according to the severity of the diarrhea, one of the three following diets should be ordered:

1. *Water Only.*—The patient is given simply water, water sweetened with sugar, or albumin water (the whites of four eggs mixed in with a liter of boiled water, strained through a fine-meshed cloth, and sweetened with four tablespoonfuls of milk sugar).

2. *Liquid Diet.*—Vegetable broths, milk mixed with plain or Vichy water.

3. *Milk and Vegetable Diet.*—This is to consist mainly of pastes, purées of dried vegetables, and rice in various forms. Directions for the prepara-

tion of *alkaline rice*, which I order frequently with very good results, are herewith presented:

Boil for twenty minutes, in a pan with a lid, 1 part of Indian rice, 1 part of Vichy water, 2 parts of plain water, and a little salt. Then remove from the fire and stir the rice, keeping it gently heated, until the water has evaporated. Butter may or may not be added.

Physical Rest.—It is necessary for the patient to remain at rest in bed throughout the acute stage. The factor of warmth thus provided is in a large measure responsible for successful therapeutic results.

Heat to the Abdomen.—Dry or moist heat in the form of compresses or a hot-water bag should be kept over the abdomen continuously.

Symptomatic Treatment.—*Opium*: 6 to 8 drops of the tincture three or four times a day.

Sydenham's laudanum (*Tr. opii crocata*, N. F.): 6 to 8 drops three or four times a day.

Paregoric: One teaspoonful (representing 0.015 gram— $\frac{1}{4}$ grain—of powdered opium).

Bismuth: Subnitrate, 2 to 6 grams ($\frac{1}{2}$ to $1\frac{1}{2}$ drams), or subsalicylate, 1 to 3 grams (15 to 45 grains).

Lactic acid: The following solution to be taken in the course of the day, in divided amounts of 1 wineglassful:

℞ Acidi lactici	8 c.c.	(f3ij);
Aquæ bulliatæ	1 liter	(Oij).—S.

Methylene blue (diarrhea in tuberculosis):

℞ Methylthioninæ chloridi,	
Lactosi	āā 0.1 gram (gr. iss).
Pone in cachet. No. i. Da tal. No. xxx.	
Sig.: Two to four cachets a day.	

Etiologic (Causal) Treatment.—Any treatment of a persistent diarrhea should be causal.

One must seek by laboratory procedures to determine the source of the diarrhea, which may be:

Of gastric origin.

Of duodenal origin.

Originating in the right side of the large intestine.

Or, in the left side of the large intestine.

Diarrhea of Gastric Origin.—In this case fecal examination discloses an abundance of all forms of food residue.

1. If muscle fibers and elastic connective-tissue fibers predominate, insufficiency of gastric secretion should be thought of, and the missing acid replaced by such preparations as gasterine (dog's gastric

juice), dyspeptine (hog's gastric juice), or hydrochloric acid. Following is a formula of Mathieu's:

Hydrochloric acid (official)	20 c.c. (f3v);
Water	180 c.c. (f3vj).

One or two teaspoonfuls of this solution are to be mixed in with a glass containing sweetened albumin water; this mixture is prepared in the morning, in order to prolong the contact and allow combination of the hydrochloric acid with the albumin, the acid being then much less irritant to the mucous membrane. The solution is taken with the two main meals, at intervals, in several swallows.

2. If the starches predominate, bread should be interdicted, and less starchy food allowed, meat and eggs taking their place. I have shown that the experiments of Roger on the synergism of the saliva and the pancreatic amylase have a clinical bearing. In these forms of diarrhea all that is necessary is to induce the patients to masticate at length, in order to produce much saliva, or even to use chewing gum after meals.

Diarrhea of Duodenal Origin.—Here also there are found in the feces nitrogenous, starchy and fatty residues. It is often difficult to make a scientific demonstration of such duodenal origin, but if the latter is suspected, an organotherapeutic treatment can always be tried, *viz.*, pancreatin or pancreatinokinase (a combination of pancreatin and enterokinase) in doses of 0.5 to 1 gram ($7\frac{1}{2}$ to 15 grains) after meals.

Diarrhea Originating in the Small Intestine.—This is uncommon, for even in diarrhea the transit through the small intestine is rarely shortened (three to four hours).

Diarrhea Originating in the Right or Left Side of the Colon.—See *Colitis*.

Following are suitable directions, as given by Comby, for the treatment of **simple diarrhea in infants**:

A. Breast-fed Infants.—1. Diarrhea of varying frequency, liquid and copious, greenish-yellow or colorless, homogeneous or irregularly colored and flaky, sometimes frothy; generally not serious. Its cause should be investigated and treated by hygienic measures rather than by drugs: Six feedings a day at three-hour intervals, except in debilitated and premature infants, who should receive eight or ten feedings at two-hour intervals.

2. The infant should be weighed before and after the feedings in order to find out the quantity of milk taken in the twenty-four hours— $\frac{1}{10}$ of the body weight in sturdy children and $\frac{1}{8}$ or $\frac{1}{4}$ in small and

debilitated children. If this ratio is being exceeded, the feedings should be shortened from fifteen or twenty to eight or ten minutes.

3. The diet of the mother or wet-nurse should be corrected: No wine, beer nor cider; free use of water, vegetable infusions and milk; starchy diet (bread, soups, vegetables); but little meat, no greasy acid nor spiced sauces. Walks in the open air.

4. If the diarrhea continues or becomes worse, give a good pinch of the following powder in a teaspoonful of milk or sweetened boiled water before each feeding:

℞ Benzonaphtholis	1 gram (gr. xv);
Calcii phosphatis præcipitati (N. F.)	2 grams (gr. xxx);
Bismuthi subnitratis	3 grams (gr. xlv).—M.

5. If the diarrhea still keeps up, with loss of weight, mixed milk feedings may be tried (addition of animal milk at each or every other feeding). Lastly, if all measures definitely fail, the question of a change of nurse may be taken up. There should never be any haste in advising weaning of the child.

B. Bottle-fed Infants.—1. Diarrhea generally more serious and persistent, sometimes associated with fever and foul odor of the stools, which are colorless, whitish, grayish, or green, bilious, slimy and ropy. Milk should be left off for twenty-four to forty-eight hours and replaced by boiled water or rice water, then by vegetable broth.

2. A lactic acid mixture (Hayem's) may be prescribed at the same time:

℞ Acidi lactici	2 c.c. (f3ss);
Syrupi rubi idæi (N. F.)	30 c.c. (f3j);
Aquæ bulliatæ	60 c.c. (f3ij).

M. Sig.: One teaspoonful every two hours.

3. If the foregoing preparation fails, the following should be ordered:

℞ Bismuthi subnitratis	2 grams (3ss);
Benzonaphtholis	1 gram (gr. xv);
Tincturæ opii camphoratæ	0.5 c.c. (m viij);
Syrupi cydoniæ (quince)	15 c.c. (f3ss);
Aquæ bulliatæ	80 c.c. (f3xxiss).

M. Sig.: Shake before using; one teaspoonful every two hours.

4. The abdomen should be kept warm with moist compresses or a layer of cotton covered by oiled silk and a bandage. Bottles, nipples and clothing to be kept scrupulously clean. The child should be given fresh air.

5. If vomiting is superimposed on the diarrhea and a condition of dehydration results, subcutaneous or intramuscular injections of salt

solution, diluted sea water or glucose-saline solution (25 to 50 c.c.— $\frac{5}{6}$ to $1\frac{2}{3}$ ounces—twice a day) should be given, or the same solutions administered by rectal drip.

6. Feeding should be resumed very cautiously and gradually, beginning with vegetable bouillon, milk diluted one-half with water, skimmed milk, dried milk, kephyr, yoghurt, plain or malt gruels, etc.

DYSPNEA.

[δύς, *ill* ; πνεῖν, *to breathe*.]

The symptom **dyspnea** offers particular occasion for repeating once again the sempiternal injunction: "The proper treatment for dyspnea is the treatment of its underlying cause." The measure required may be a tracheotomy in croup, puncture of the pleura in pleurisy with extensive effusion, venesection in uremia, and a good dose of digitalis and appropriate diet in heart-failure.

Consideration of the subject here will be limited, therefore, to:

1. A short review of the commoner causes of dyspnea and enumeration of the kinds of treatment indicated.
2. A brief sketch of the drugs most generally employed for the relief of dyspnea or improvement of respiration.

REVIEW OF THE COMMONER CAUSES OF DYSPNEA AND THE MEASURES GENERALLY USED IN THEIR TREATMENT.

I. Dyspnea of Respiratory Origin.

(A) OF LARYNGEAL ORIGIN:

Foreign body: Removal of the same.

Pseudo-membrane (diphtheria): [1. Suction.] 2. Intubation or tracheotomy. 3. Diphtheria antitoxin in large doses.

Laryngeal spasm (laryngismus stridulus): 1. Antispasmodics: Bromides, belladonna, morphine. 2. Hot compresses over the larynx. 3. Inhalations, etc.

Laryngeal tumors: Excision.

(B) OF PLEURO-BRONCHIO-PULMONARY ORIGIN.

(1) *Simple, "normal" dyspnea*: Treatment of the causal disorder—tuberculosis, bronchitis, etc.

(2) *Intense, distressing dyspnea*:

(a) Dependent upon *intense congestion*, as in *pneumonia*: Dry and wet cupping; moist packs, with or without mustard; if required, venesection (to be used regularly in edema of the lungs).

(b) Dependent upon a *sharp pain in the side*, as in *beginning pneumonia*: Wet cupping over the seat of pain, or blistering (wound to be dressed with petrolatum containing morphine); hypodermic of morphine.

(c) Dependent upon *bilateral effusion*, as in *pleurisy*: Paracentesis thoracis.

(d) Dependent upon a *pronounced bronchial spasm*, as in *asthma* (see separate section on *Asthma*).

II. Dyspnea of Cardiac Origin.

(A) Typical condition: TRUE CARDIAC INSUFFICIENCY WITH PARTIAL OR COMPLETE HEART-FAILURE.—The treatment merges into that of partial heart-failure:

1. Heart-tonics: Digitalis, caffeine, sparteine, cardiac organotherapy, etc.

2. Restricted diet, especially as regards fluids and chlorides.

3. Carefully regulated exercise, from complete rest to progressive training.

4. Adjunct measures on occasion: Wet cupping, venesection, purgation, and various forms of puncture.

(B) Typical condition: CARDIAC NEUROSIS: *Krishaber's cerebrocardiac neuropathy*.—The neurotic condition should be treated by:

1. Suggestion, an endeavor being made to convince, soothe and reassure the patient.

2. Antispasmodic sedatives: Valerian, bromides, etc.

3. Tepid baths.

4. Progressive myotherapy.

(C) Typical condition: PERICARDITIS.

1. Counterirritation over the precordium: Cauterization, wet cupping, blistering.

2. Puncture of the pericardium in the event of effusion.

III. Dyspnea of Dyscrasic Origin.

(A) ANOXEMIA: Typical condition: Hyposphyxia (see *High blood-pressure*).

Three therapeutic agencies are of prime importance in this condition:

1. Breathing exercises (*q.v.*).

2. Endocrin medication: Adrenals, ovary, thyroid, etc.

3. Hypodermic injections of oxygen gas.

(B) UREMIA: Typical condition: *Cheyne-Stokes breathing*, *cardio-renal insufficiency*.

1. Blood-letting: Local, as by wet cupping over the kidneys, and general, 200 to 500 c.c. (6 to 16 ounces) according to indications.

2. Purgation: Aloes, scammony or sodium sulphate.

3. Diet low in nitrogenous foods and in chlorides, in the following series:

- (a) Water only.

(b) Strict fruit diet.

(c) Milk diet.

(d) Diet of milk, vegetables and fruit.

(e) Mixed diet low in chlorides and in nitrogen.

4. Inhalations and hypodermic injections of oxygen gas.

(C) ACETONEMIA: Typical condition: *Diabetic coma*.

1. *Alkalies in high dosage* by the mouth or intravenously.

2. Inhalations and hypodermic injections of oxygen gas.

(D) CARBON MONOXIDE POISONING.

1. Fresh air.

2. Inhalations (and hypodermic injections) of oxygen gas, or better, of a mixture of oxygen and carbon dioxide (10 to 15 per cent.).

3. Blood-letting to be avoided (Nicloux).

IV. **Dyspnea of Neurotic Origin:** Typical condition: *Hysteria, cardiac neurosis*.

1. Psychotherapy.

2. Nerve sedatives: Bromides, valerian, borneol esters, ultimately morphine.

3. Hydrotherapy.

In general, whatever be the type of dyspnea and whatever its cause (pulmonary, cardiac, toxic or mixed), hypodermic injections of oxygen are often very useful. This is particularly the case in asphyxic or hyposphyxic conditions.

In chronic forms of dyspnea, particularly in chronic dyspnea in childhood, in emphysematous patients, and in former pleurisy cases, *breathing exercises* and *respiratory mechanotherapy* are strongly indicated. These measures will be found described in the section on *Therapeutic Procedures*. They are of great importance from the standpoint of pathologic physiology.

The attacks of **paroxysmal dyspnea** commonly known as "*asthma*" are dealt with in a separate section of this work.

EUPNEIC DRUGS (see also *Asthma*).

Certain drugs exert a selective action in easing or facilitating respiration. Most of them will be found enumerated in the section on *Asthma*. To mention only those most commonly used, we have: Oxygen, the opium derivatives (especially codeine), the iodides, lobelia, stramonium, grindelia robusta and pyridin. In general, the rough sedatives and expectorants are indirectly eupneic agents.

OXYGEN, administered by hypodermic injection, is especially eupneic in conditions of asphyxia and hyposphyxia. (See *Oxygen* under *Medicinal Agents* and *Therapeutic Procedures*).

The OPIUM DERIVATIVES are sometimes the most effective agents in allaying respiratory difficulty. An *injection of morphine* at once relieves dyspnea due to pain, excitement or spasm. *Codeine* is deserving of special mention. An unofficial preparation known as *codeine biniodide* [$C_{18}H_{21}NO_3 (H_2I)_2 + H_2O$] or iodein is remarkably effective in this connection. It is prescribed in solution, pills or by injection in the dose of 0.05 to 0.15 gram ($\frac{3}{4}$ to $2\frac{1}{2}$ grains) a day. It contains 51 per cent. of codeine and 43 per cent. of iodine, and is soluble in 60 parts of cold water.

The iodides are serviceable in all forms:

Ethyl iodide, C_2H_5I , a volatile fluid, may be inhaled in attacks of asthma and cardiac dyspnea.

The *alkali iodides*, alone or in conjunction with expectorants (sodium benzoate, etc.), cough sedatives (codcine, etc.), stimulants (caffeine, ammonium acetate, etc.) or heart-tonics (digitalis, etc.), may be used in dyspnea of cardio-pulmonary origin.

Special mention in this group may be made of *caffeine iodide* (eupnin), which is very useful in chronic dyspneic cases in doses of 1 to 2 grams (15 to 30 grains) a day in divided amounts of 0.5 gram ($7\frac{1}{2}$ grains).

Iodo-albuminates.—These may be prescribed in chronic toxic forms of dyspnea in the metabolic diseases and in cardiorenal cases.

LOBELIA acts selectively on the medullary center and the bronchial muscles of Reissessen. It is used mainly in the form of the tincture [*Tinctura lobelia*, U. S. P., 1 c.c. (15 minims)], combined with potassium iodide and opium, as in the following formula, often very effective in asthma:

℞ Tincturæ lobeliæ	30	c.c.	(f3j);
Fluidextracti senegæ	3	c.c.	(℥xlv);
Extracti opii	0.1	gram	(gr. iss);
Potassii iodidi	8	grams	(3ij);
Glycerini	8	c.c.	(f5ij);
Alcoholis	10	c.c.	(f3iiss);
Syrupi aurantii amari	24	c.c.	(f5vj);
Aquæ cinnamomi .....q. s. ad	150	c.c.	(f3v).

M. Sig.: One teaspoonful every fifteen minutes during an attack.

STRAMONIUM is mainly employed as a component of anti-asthmatic powders and cigarettes.

℞ Stramonii pulveris,	
Belladonnæ foliorum pulveris,	
Hyoscyami pulveris,	
Potassii nitratis	āā 10 grams (3iiss).

M. Sig.: *For external use*. Burn one teaspoonful of the powder in a saucer and inhale the fumes (for an attack of *asthma*).

GRINDELIA may be used in doses of 1 to 4 c.c. (15 to 60 minims) of the fluidextract in emphysema, asthma and whooping-cough. Thus:

Rx Fluidextracti grindeliæ (N. F.)	1 c.c. (℥xv);
Tincturæ lobeliæ	2 c.c. (fss);
Syrupi aurantii florum	30 c.c. (f℥j);
Aquæ destillatæ	60 c.c. (f℥ij).

M. Sig.: To be taken in the course of one or two days. (*Asthma in children.*)

EDEMA.

[οἰδημα, from οἰδεῖν, to swell.]

Only the general causes of edema and a syllabic presentation of their treatment need be given here.

Edema of cardiac origin should be treated with the measures appropriate for heart disease, which may be summarized thus:

In the stage of incipient cardiac insufficiency:

Relative rest, with dorsal recumbency for a prolonged period.

Reduced diet, low in chlorides, with reduction of fluids to $1\frac{1}{2}$ or at most 2 liters.

Digitalis in divided doses amounting to 0.4 to 1 cubic centimeter (6 to 15 minims) of the tincture a day, given intermittently (three days in each week).

Theobromine in moderate dosage, 1 gram (15 grains) a day, and intermittently (three days in each week).

In the stage of pronounced cardiac insufficiency:

Absolute rest in the reclining posture.

Karell diet (temporarily): 800 c.c. of milk a day.

Purgation by salines or vegetable cathartics.

Digitalis to the amount of 1 gram (15 grains) of the leaves or 0.001 gram ($\frac{1}{65}$ grain) of French digitalin (digitoxin) in one dose or in three divided doses.

Thereafter, as above.

Edema of renal origin, frequently combined with the preceding variety, should be treated, in general, by:

Chloride-free diet.

Diuretic, purgative and diaphoretic medication, as follows:

Diuretic: Theobromine, lactose, digitalis, onions, etc. (See *Diuretics*.)

Purgative: Salines in small repeated amounts (sodium sulphate, 5 to 15 grams—75 to 225 grains—a day).

Vegetable cathartics in effective dosage for a short time only (aloes, compound jalap tincture, scammony).

Cholagogues: Calomel, used cautiously.

Diaphoretic: Potassium nitrate. (Dover's powder, 0.5 to 1 gram— $7\frac{1}{2}$ to 15 grains—a day).

Diffusible stimulants, especially ammonium acetate.

Heart-tonics, if necessary: Digitalis, strychnine, sparteine.

Blood-letting, especially in the lumbar regions: *Wet cupping*.

*Whether the edema be of cardiac, renal or cardiorenal origin, if it is pronounced and inveterate there is nearly always advantage in treating it first directly, by mechanical means—in “lifting the peripheral barrage,” as Huchard used to say. The measure formerly recommended in these cases consisted of puncturing the lower extremities with a needle heated in a flame or the point of the thermocautery. From the beginning of the era of antiseptics the advice was given to disinfect the skin at the sites of puncture and to protect it against infection insofar as possible by a suitable protective aseptic dressing. In spite of these precautions, lymphangitis remained a not infrequent complication. At the present time there is no doubt that the method of choice consists of drainage of the subcutaneous cellular tissue by means of Southey’s tubes (see *Therapeutic Procedures*).*

Edema of dyscrasic origin, when the result of tuberculosis or neoplasm, is of ominous significance and is practically beyond the resources of medical art.

If it is of anemic origin, being related to disturbed blood production, it will yield to hematopoietic and tonic medication (arsenic, iron and iodotannic preparations, cinchona, and calcium salts). The serum of bled horses should here be used only with great caution, as some of these patients are suffering from the chlorotic anemia of Bright’s disease.

Edema of hepatic origin, is rare and is seldom sufficiently pronounced to require special treatment. It follows the fluctuations of the causal disorder.

Edemas of neuropathic or dystrophic origin are asserted to be amenable to local measures, such as massage, kneading, hot air and local astringent applications.

* * *

As for the **edemas of local origin**, only two forms will require consideration:

Inflammatory edema, the treatment of which may be divided into two stages:

(a) *Acute or lymphangitic stage*: Treatment of the infection: (1) Local: Wet dressings, incision of a carbuncle, etc. (2) General: Specific treatment; specific vaccines when indicated; collargol, etc.

(b). *Chronic stage, with the indurated edema of sclero-cellulitis*: Local absorbent treatment by massage, hot air, kinesitherapy, effleurage, absorbent applications (alcohol, etc.).

Edema of venous origin.—Here again the treatment may be divided into two stages:

(a) *Acute or phlebitic stage*: Example, puerperal phlebitis.—Treatment of the infection: (1) Local: Absolute immobilization on a splint; absorbent applications (alcohol, diluted lead subacetate solution, ammonium chloride, etc.) or sedative applications (opium preparations, laudanum). (2) General: Collargol; when indicated, bacterial vaccines or sodium salicylate (as antirheumatic).

(b) *Subacute and chronic stage*, with *phlebosclerosis, edema with induration, cellulitis*: Local absorbent treatment and circulatory stimulation.

First period: Effleurage, light pétrissage, passive movements, hot air.

Second period: Superficial and deep massage, active movements against resistance.

Third period: Systematic exercises of the lower extremities, resolvent massage for the cellulitis, cold hydrotherapeutic measures.

Drugs to tone up the veins: Hydrastis, hamamelis.

If necessary, the wearing of elastic stockings or bandages.

* * *

In conclusion, it is necessary to point out that not all varieties of edema should be indiscriminately combatted. Certain kinds of edema actually appear as salutary attempts to set aside an excess either of salt or of pharmaceutic or metabolic poisons; abrupt absorption of an edema (*e.g.*, through the action of digitalis or theobromine) has, indeed, been known—though exceptionally—to be accompanied by severe toxic manifestations (convulsions, delirium, torpor, dyspnea, coma, etc.). Hence the recommendation to drain the infiltrated tissues whenever possible and to seek only a moderate and gradual absorption of the edema. In brief, in this connection as elsewhere, the practitioner should remain a clinician and carefully analyze the disturbance he is endeavoring to overcome.

EPISTAXIS.

[ἐπί, upon; σταῆεν, to drip.]
Nasal hemorrhage.

Aside from the treatment of its cause, **epistaxis** requires no special treatment unless it is of considerable amount, is prolonged, or recurs too often.

Not infrequently, indeed, **epistaxis is a salutary occurrence**, acting as a "safety-valve," and should be allowed to go unchecked, particularly in cases of plethora, hemorrhoids, and in cardiac and arteriosclerotic cases. This is a controversial question of some importance which had better be dealt with at once.

* * *

THE EPISTAXIS OF HIGH BLOOD-PRESSURE CASES.

One of the commonest causes of epistaxis—or at least, the one which the physician is oftenest called upon to treat—appears to be high blood-pressure and its ultimate result, arteriosclerosis. Perhaps the epistaxis of arteriosclerotics is, all in all, less frequent than, *c.g.*, the epistaxis of adolescents; but it is distinguished from the latter by its amount which is sometimes alarming, by its almost periodic recurrence in some subjects, and lastly, by the therapeutic problem to which it gives rise, to wit: **Shall it be checked or not?** *This is a question of great practical moment.*

* * *

The epistaxis of high-pressure, arteriosclerotic cases clearly occurs in individuals already past middle age. These individuals are either plethoric, full-blooded or gouty persons, or old people with advanced arteriosclerosis; in either instance, a concomitant albuminuria will sometimes be found.

The nosebleed comes on after a hearty meal, walking against the wind, prolonged exertion, etc., in short, after some condition causing a more or less abrupt rise of blood-pressure. It is worthy of note in this connection that these hemorrhages are commonest in the cold season, during the winter months. In some patients, indeed, one is tempted to recognize a kind of annual periodicity, the nosebleed re-

currence for several years at almost the same time: In one of my patients, epistaxis occurred for three years in the second half of the month of December, and in the following year, in November; in another, it recurred at an interval of one year, late in February and early in March; in a third, hemorrhages in various situations (epistaxis, hemoptysis, hemorrhoids) recurred for several years in January, February and March. One sees herein merely a clinical confirmation of the experimentally well-established action of cold on the blood-pressure.

The bleeding is nearly always copious and rather persistent; it may recur for several days, sometimes for several weeks, on the slightest provocation.

It is generally accompanied by the usual evidences of high blood-pressure: Hard, vibrant pulse; sharp, hammer-like quality of the second sound at the base; more or less marked visible pulsation of the superficial arteries. The face is often congested and reddened. Headache and a feeling of tension or congestion of the brain are nearly constant.

Not infrequently the added presence of small submucous or subcutaneous capillary hemorrhages is noted, *e.g.*, subconjunctival hemorrhages. One of my patients observed twice, at an interval of six months, the appearance, in conjunction with a recurring epistaxis, of an ecchymosis under the skin of the plantar surface of the right great toe.

Rather often the patient is subject to other hemorrhagic developments. Thus, in an arteriosclerotic case alluded to above, I was called upon to treat in January, 1902, a copious hemoptysis which lasted ten days and which had followed a sharp exacerbation of hemorrhoids; in March, 1903, a copious nosebleed, after a day of high wind and a sudden, pronounced drop of barometric pressure; in January and February, 1904, repeated hemorrhages from piles. In the succeeding years similar manifestations occurred in the same season of the year and under similar circumstances until, in February, 1912, the patient died of cerebral hemorrhage. Epistaxis is a symptom very often met with in the past histories of cases of hemiplegia.

Above all, *should one try to check the epistaxis of high-pressure arteriosclerotic cases?*

It is my belief that the symptom should not be checked provided it does not exceed a certain amount and as long as the blood-pressure remains high.

The nosebleed of arteriosclerotics marks the opening of a safety-valve to avoid a blow-up of the machine; it is the quasi-providential escape of blood which forestalls the imminent hemorrhage in an

internal organ. On the whole, it is better to rupture a vessel in one's nasal mucosa than an arteriole in one's brain.

In this connection I readily recall the case of an old man with advanced arteriosclerosis who, one winter's day, about 10 p. m., after dining with some friends, while leaving their house to go home, with the temperature a number of degrees below freezing, experienced the sudden dizziness and stunning head-blow of apoplexy and fell against the plate-glass of a restaurant, which broke and made a cut in his superciliary region involving the supraorbital artery. He was carried home, the wound flooded with ferric chloride, but the bleeding from the artery continued; he gradually regained consciousness. When I was called, about 2 a. m., four hours after the accident, the patient's face, beard, hair and the pillow appeared as a single large clot, over which a thin bloody stream was still trickling; the pulse was extremely weak and collapse imminent, but there was no trace of paralysis. The artery was ligated and a perfect recovery followed. It seems quite plain that this accidental loss of blood occurring synchronously with the process of cerebral congestion saved the man from an otherwise certain cerebral hemorrhage; the blood-letting was rather free, that is all.

This case appears to me to indicate the guiding principles to be followed in cases of epistaxis in arteriosclerotics: *The nosebleed should not be checked as long as high blood-pressure is manifest, and the main endeavor should be to overcome this high pressure, if possible; active local intervention is indicated only when the general congestive phenomena have subsided, without waiting, however, until, as in the foregoing case, the blood-pressure has become very low and collapse is imminent.*

* * *

Thus, in the **first stage, that of high blood-pressure**, at the beginning of the epistaxis, when the congestive disturbance is manifest, the pulse tense, the face flushed, and the second sound at the base exhibiting a hammer-like quality, the treatment should consist merely in placing the patient in a cool room (12 to 15° C.—55 to 60° F.), in an armchair, with the body well raised and conveniently braced with pillows or cushions, the neck free of all impediments to the venous circulation, the head leaning slightly forward over a suitable receptacle, and the body warmly wrapped in a house coat or blankets.

Counterirritation to the lower extremities should be instituted in the form of mustard applications or mustard wrappings about the thighs and calves, and a mustard foot-bath; or hot packs of cotton leg and foot wrappings covered with a layer of impervious material.

Cold applications to the head should be made at the same time in the form of frequently renewed cold compresses; if, indeed, brain congestion seems threatening, there should be no hesitation in applying an ice-bag to the head, over a layer of flannel.

Absolute rest should be ordered; silence and quiet should be enjoined upon the associates, always frightened in such a case and all the more inclined to urge the physician to active measures the more time has been wasted before calling upon him in applying bunches of keys to the patient's back or giving ferric chloride by the mouth. To ward off their suggestions more easily, the epistaxis should be represented to them as a fortunate, providential occurrence which is likely to forestall much more serious events.

The patient should be placed on a **milk diet, with slightly acid beverages** (orangeade, lemonade).

If need be, **capsules of castor oil or aloes pills** may be prescribed to insure evacuation of the bowel and exert a derivative effect.

There remains but to wait patiently. Generally, by reason of the physical and mental quiet and the loss of blood, the manifestations of high blood-pressure will diminish of their own accord, then disappear, and at the same time the nosebleed will stop, without other outside interference, after having exerted all of its beneficial action.

* * *

If, however, the epistaxis continues unabated, while the pulse grows weaker, the sharp clapping sound at the base disappears, and evidences of low blood-pressure make their appearance, the time for active intervention will have come.

Generally the procedure required is very simple, consisting merely of *anterior packing through the bleeding nostril with dressing forceps and sterile gauze cut into long strips and moistened with an antiseptic hemostatic solution, preferably a 50 per cent. solution of antipyrin or full strength hydrogen peroxide solution.* This simple measure has always proven sufficient in my experience. To make the tampon more rapidly effective, a little pressure may be made locally by pinching the nostril between the thumb and forefinger, the forefinger being applied against the septum in the nostril of the sound side and the thumb against the external ala of the bleeding nostril, or *vice versa*.

* * *

If this procedure should prove inadequate, recourse should be had to the radical treatment of epistaxis, consisting of procedures avail-

able, like the preceding, to all practitioners. The description of this form of treatment presented below is by Dr. Georges Laurens.

Radical Treatment of Epistaxis (G. LAURENS).—A. **Mild Hemorrhage**.—Applications of cotton dipped in cocaine or adrenalin solutions should not be employed, as the momentary ischemia produced through con-



Fig. 239.—Digital compression of the ala nasi.

This is the first procedure to be employed in hemorrhage.

Make firm pressure with the finger for several minutes on the ala against the septum (the most rational procedure, since the pressure is exerted over the source of the hemorrhage).



Fig. 240.—Application of a hemostatic fluid.

Introduce into the nasal cavity tampon of cotton or gauze of the size of a small filbert dipped in a solution of antipyrin in water (equal parts) or full-strength, neutral hydrogen peroxide solution.

traction of the vessels soon passes off, when vasodilatation occurs. One of two procedures should be used: Pressure, or the application of a hemostatic solution. (See Figs. 239 and 240.)



Fig. 241.—Laurens's nasal hemostatic bag.

This is a small cylindric bag of thin rubber, 5 or 6 centimeters (2 to 2½ inches) long, ending in a tube, likewise of rubber, in the lumen of which is inserted a small mandrin to facilitate introduction into the nose. The mandrin is merely an ordinary probe wrapped with cotton, in order not to puncture the rubber, or a narrow grooved director. Sterilization is effected simply by boiling.

Rubber bags of different lengths should be at hand, to fit different nasal cavities.

This is a thoroughly serviceable device, effective in stopping the hemorrhage in 95 per cent. of cases, which I have been using to the exclusion of all others for many years, and the simplicity of which renders it available to all practitioners.

B. Serious Hemorrhage.—The patient should be enjoined to stay quiet, and the family kept away. The vestibule should be cleaned out, the lip and nostril also cleansed, and clots removed from the pharynx.

The nasal cavities should be cleared of the obstructing clots. For this purpose, the patient is made to blow his nose forcibly, making pressure on the nostrils alternately. A stream of fresh blood appears at once; the patient should be reassured. From which nasal cavity is the blood coming if the hemorrhage is bilateral? Generally, from the one through which bleeding reappears as soon as the patient has blown his nose. Use of a nasal speculum will give more definite information.

There are three procedures to check the flow of blood: 1. Introduction of a hemostatic rubber bag, which I have had constructed for my own use. 2. Anterior tamponing. 3. Posterior tamponing—a makeshift.

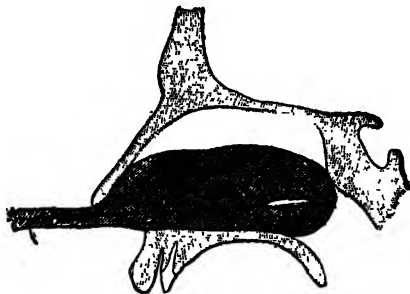


Fig. 242.—Introduction of the rubber bag into the nose.

First of all, the family should be reassured as to the patient's condition. The lip and nasal orifice are then quickly cleansed of the blood clots and of the dirty magma produced by the ferric chloride previously applied.

Next have the patient open his mouth, and if there are any clots in the pharynx causing nausea, remove them with a hemostat. Then close the nostril of the sound side with the finger and request the patient, however loath he may be to do so, to blow out strongly through the bleeding nostril. The clots are thus expelled, the nostril is free, and a jet of red blood at once escapes.

Then insert the rubber bag. For this purpose, pass a grooved director in through the tube to the bottom of the bag and push the latter into the nasal cavity in an absolutely horizontal direction, *i.e.*, grazing the nasal floor. In this manner it cannot go astray. As soon as the whole of the bag has passed in, withdraw the grooved director.

1. Introduction of a Special Condom into the Nose.—The use of this device is illustrated and explained in Figs. 241, 242 and 243.

2. Anterior tamponing.—If the special device alluded to is not available, anterior tamponing should be carried out (Fig. 244).

3. Posterior Tamponing.—This is required only: 1. If the two foregoing procedures have failed. 2. If the physician is unfamiliar with rhinoscopy. The risk of infection of the ear and sinuses is very

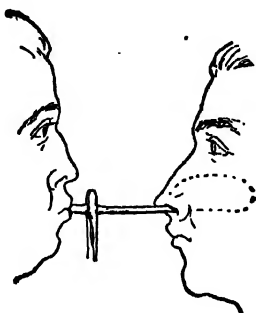


Fig. 243.—Inflation of the rubber bag.

This is done by blowing into it, either with the mouth or with a small rubber bulb, until the bag is wedged in and cannot be drawn out of the nose. Excessive inflation should, however, be avoided on account of the resulting pain.

Next, close the tube with a hemostat and apply a ligature to prevent deflation. Then remove the hemostat.

If the blood continues to flow, inflation is insufficient; blow in more air.

If introduction of the bag seems difficult, insert a speculum, which will reveal a ridge or deviation, showing what direction should be imparted to the device.

After twelve to eighteen hours, at the latest, remove the rubber bag. This is quite painless, and the flow of blood will have been checked.

great. Edema of the soft palate, painful dysphagia, etc. (Figs. 245, 246 and 247).

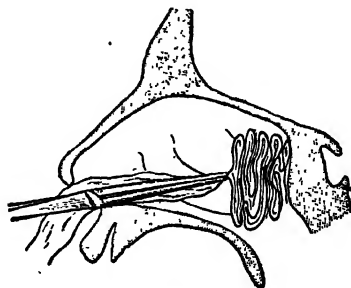


Fig. 244.—Anterior tamponing of the nasal cavity.

After evacuation of the clots, insert a speculum, illumine the nasal cavity and introduce deeply upward and backward, to the bottom of the nasal fossa, with narrow-jawed forceps, a strip of sterile gauze about 50 centimeters (20 inches) long, of the size of the little finger. Pack it in from before backward like an accordion, in such a way as to occlude the nasal cavity completely.

Twenty-four hours later, remove the gauze by moistening it with hydrogen peroxide in order to loosen it.

N.B.—In the course of these severe hemorrhages, the patient's general condition should be kept under observation.

In the event of a tendency to collapse, camphor in oil and caffeine may be injected. The patient should be placed in recumbency, with the head low, and external heat applied. Injections of physiologic

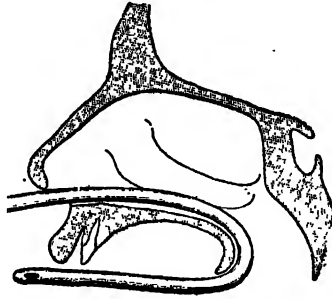


Fig. 245.—Posterior tamponing of the nasal cavity.

Articles Required.—A soft rubber catheter, a hemostat, gauze or cotton, a coarse and long silk thread, and a tongue-depressor.

First Step.—Pass the catheter into the nose horizontally, grazing the nasal floor. Grasp its extremity in the pharynx, bring it forward out of the mouth, tie the end of a strong silk thread through the orifice of the catheter and a large gauze tampon of walnut size at the other end of the thread.

salt solution (100 to 200 c.c.— $3\frac{1}{2}$ to 7 ounces) should be given if the pulse is weak, but not if it exhibits high tension.

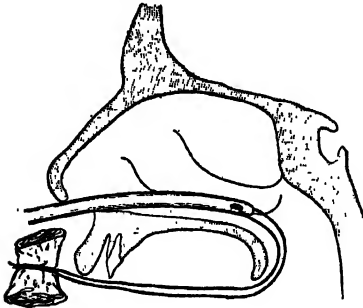


Fig. 246.—*Second step.*—The catheter is drawn out and the cotton tampon pulled into the nasopharynx.

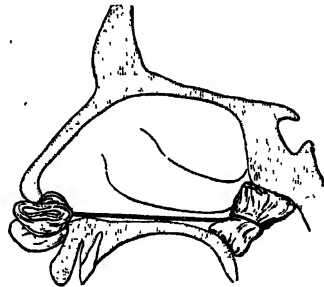


Fig. 247.—*Third step.*—Attaching a tampon of gauze or cotton at the orifice of the nostril, between the two strands of thread.

Arrest of hemorrhage will take place through the formation of clots in the nose. The tampons are removed at the end of thirty-six hours. The tampon at the nostril is first cut free and that occluding the nasopharynx then removed with the forefinger.

To increase the coagulability of the blood in serious cases one may either prescribe calcium chloride in a daily amount of 3 to 5 grams (45 to 75 grains), or better, resort to serum therapy.

R. Calcii chloridi	6 grams (3iss);
Syrupi aurantii	30 c.c. (f3j);
Aquæ cinnamomi	20 c.c. (f3v);
Aquæ destillatæ	60 c.c. (f3ij).
M. Sig.: One tablespoonful every two hours.	

In the serum treatment, diphtheria antitoxin or plain horse serum may be injected to the amount of 30 cubic centimeters.

C. Prophylactic Treatment of Epistaxis.—This subject has been discussed in Vol. I, under *Therapeutic Procedures Relating to the Respiratory Tract: V. Treatment of Epistaxis*.

* * *

Is there such a thing as a medical treatment of epistaxis, *per se*, i.e., an internal medical treatment capable of arresting epistaxis independently of the treatment of its cause? I doubt it very much. **Epistaxis terminates spontaneously or as a result of local treatment.** Does internal medication exert any influence whatever on the course of the bleeding? This is a question which it is practically impossible to answer with certainty.

In the *stage of low blood-pressure* vasoconstrictor agents of moderate power, such as ergot, hamamelis and digitalis in small doses, may be given without any special drawback, *e.g.*:

R. Digitalis pulveris	0.03 gram (gr. ss);
Ergotæ	0.1 gram (gr. iss).
Ft. pil. No. i. Da tal. No. xii.	
Sig.: Four pills a day for three days.	

Or, fluidextract of hamamelis [*Fluidextractum hamamelidis foliorum*, N. F., 2 c.c. (30 minims)] may be given in doses of 20 to 40 drops three times daily for a week.

A *solution of calcium chloride* may also be employed, *e.g.*:

R. Calcii chloridi	2 to 4 grams (3ss-j);
Syrupi	30 c.c. (f3j);
Aquæ destillatæ	100 c.c. (f3iiss).
M. Sig.: One tablespoonful every two hours.	

It would be easy to give a much longer list of supposedly hemostatic preparations with the help of which the physician may, without much risk to the patient, disguise his policy of "armed expectancy," and to indite the prescription without which, in the minds of many patients, no respectable plan of treatment is complete.

It seems more important to mention, not what should be prescribed, but what should be avoided; for in the condition under consideration, incorrect medication is more to be feared than the affec-

tion itself. An absolute ban should be placed on that which one might be tempted to prescribe by way of "reflex" treatment, so-called (although reflex action has nothing to do with it), *viz.*, the strongly vaso-constrictor hemostatics, foremost among which is adrenalin, an extremely dangerous drug in high-pressure cases; even injections of ergotin and the administration of digitalis in large doses should be avoided. Nitroglycerin and amyl nitrite are ineffectual and dangerous.

* * *

Accordingly, when the epistaxis has been arrested by mechanical means at what appears to be the opportune moment, the physician should turn to the treatment of the cause, and endeavor to prevent recurrence of the symptom by combatting the underlying high blood-pressure, infection [malaria, diphtheria, typhoid fever, syphilis (nasal gumma)], hemophilia or hepatic degeneration.

EXPECTORATION.

[ἐξ, out of, pectus, chest; expulsion
of abnormal secretions from the
respiratory tract.]

A comprehensive account of the treatment of **expectoration** would include that of its cause (*e.g.*, tuberculosis, pneumonia) and a discussion of all procedures (open air and climatic treatments) capable of exerting a favorable effect on the underlying lesions of the bronchi and lungs. This would amount to a review of almost all of the diseases of the lower respiratory tract. In this section, consideration of the subject will be limited to a discussion of the drugs most commonly employed to act on the bronchial secretions and of the general rules to be followed in their administration.

* * *

The drugs actually influencing the bronchial secretions are many and may be divided into several groups:

1. The *balsams*, together with *creosote* and its derivatives. 2. The *expectorants*. 3. The *sulphur compounds*.

To these should be added: 4. The *sedatives*. 5. The *vaso-constrictor agents* capable of acting secondarily on bronchial secretion and its consequences (cough, congestion, paresis of the bronchial muscle-tissue, etc.).

1. **THE BALSAMS.**—"Without at all forcing the comparison," Trousseau wrote many years ago, "it may be said that the catarrhal affections of the respiratory passages, at least those accompanied by a copious outpouring of mucus, are comparable to the catarrhal affections of the genito-urinary organs to which we apply the term *blennorrhagia*. Administration of the balsamic preparations in the treatment of the catarrhal affections of the genito-urinary tract is now so common a procedure that not only are there few practitioners who do not employ it, but there are few persons suffering from blennorrhagia who do not resort to these drugs themselves before seeking medical advice. . . . How is it, in view of the successful results obtained with the balsamic preparations in urethral blennorrhagia [gonorrhoea], that the pulmonary forms of blennorrhagia are not

more often treated by the same means . . ? In pulmonary blennorrhagia of whatever type . . . the drugs appropriate for the relief of urethral blennorrhagia are giving us really useful results. It is, perhaps, in those mucopurulent bronchorrheas, however, in which the total quantity of sputum not rarely amounts to several liters in a single day, without much cough and without any symptom of irritation—the bronchorrhea mainly observed in old persons—that the balsams are more especially indicated.”

Foremost among the balsams should be placed **turpentine** and particularly its derivative, **terpin hydrate**. In the same group are *eucalyptol*, *gomenol*, *terpinol* and *terebene*, allied to terpin hydrate, which are but slightly soluble in water, freely soluble in alcohol, ether and oils, and which are used mainly in oily solutions, capsules or by hypodermic injection in daily amounts of 0.5 to 2 c.c. (8 to 32 minims) or more.

The **balsams of tolu, of copaiba, of Peru, and Canada balsam** share the properties of the foregoing drugs. Insoluble, like them, in water, but soluble in alcohol, ether and oils, they may be used either in pills, capsules or alcoholic preparations, in daily doses of 0.5 to 2 c.c. (8 to 32 minims). Their irritating effect on the urinary tract has generally caused the preceding or following remedies to be preferred to them. Yet *syrup of tolu* is a frequent component of pectoral syrups.

Creosote and its derivatives (creosote carbonate or creosotal, creosote phosphite or phosphotal and creosote tannophosphate or taphosote, etc.) act on the bronchi in a threefold manner, *vis.*, as antiseptics, secretory remedies and sclerogenous agents. In chronic bronchitis they certainly yield, when properly used, results much superior to those obtained in tuberculosis, in which they have been incorrectly claimed to be so useful. The average effective doses are 1 or 2 c.c. (16 to 32 minims) a day. They should be prescribed either by the mouth in pills, capsules or emulsion, or preferably by enema or hypodermic injection. Certain precautions in their use are indicated on account of: 1. Their well-known irritant effect on the mucous membrane of the digestive tract (resulting in frequent gastric intolerance, whence an almost absolute contraindication in patients with irritable stomachs). 2. Their irritating action on the kidneys (whence an almost absolute contraindication in albuminuria). 3. Their combined congesting and desiccant action (whence the contraindication in the presence of congestion or acute or subacute exacerbation in chronic bronchitis).

Separate consideration should be given to two derivatives of creosote, **guaiacol** and **thiocol**.

As for *guaiacol*, pure creosote correctly administered seems to me more effective and much less toxic, and consequently, attended with less risk. One might try it, however, in chronic bronchitis in a daily amount of 0.1 to 0.3 c.c. ($1\frac{1}{2}$ to 5 minims), either in pills, in an alcoholic preparation, in a 1 or 2 per cent. solution in codliver oil, or in an enema. Crystallized *guaiacol*, chemically pure and a definite chemical compound, is sometimes preferred to the *guaiacol* prepared from creosote.

Thiocol (potassium ortho-sulpho-*guaiacolate* or *guaiacolsulphonate*), occurring as a white, odorless powder, containing 52 per cent. of *guaiacol*, of very low toxicity, non-irritant to the digestive tract and rather soluble in water (1:4), is certainly preferable to *guaiacol*. It combines in a measure the effects of the creosote-*guaiacol* group with those of the sulphur compounds. It may be given in tablets, cachets, solutions or syrups in an average daily amount of 2 to 6 grams (30 to 90 grains), preferably with the meals. (See *Pulmonary Tuberculosis*).

FORMULAS.

Creosote.

Pills:

℞ Creosoti 0.1 gram (gr. iss);
 Saponis 0.25 gram (gr. iv).
 Ft. pil. No. i. Da tal. No. lx.
 Sig.: Eight to twenty pills a day.

Capsules:

℞ Olei morrhuae 3 c.c. (℥ xlvijj);
 Creosoti 0.15 c.c. (℥ iiss).
 Ft. caps. No. i. Da tal. No. xxx.
 Sig.: Four to ten capsules a day.

Enema:

℞ Creosoti 10 c.c. (fʒiiss);
 Glycerini 80 c.c. (fʒiiss).
 M. Sig.: For an enema.

One to four teaspoonfuls of the above preparations are to be added to a tumblerful of milk, the mixture warmed, and administered as an enema, to be retained. Four drops of laudanum may be added in the event of intolerance.

Injections:

Sterilized olive oil to which 7 per cent. of creosote has been added may be used for this purpose. The dose is 5 to 20 c.c. ($1\frac{1}{4}$ to 5 fluidrams), injected slowly.

Guaiacol.

The above formulas are also applicable in the case of guaiacol, but it is wise to begin with smaller doses in order to test the patient's sensitiveness to the drug.

Thiocol.

Cachets:

℞ Pulveris ipecacuanhæ et opii 0.05 gram (gr. $\frac{3}{4}$) ;
 Thiocol 0.5 gram (gr. viiss).
 Ft. cachet. No. i. Da tal. No. xxx.
 Sig.: Four to ten cachets a day.

Solution:

℞ Thiocol 10 grams (3iiss) ;
 Tincturæ opii camphoratæ 12 c.c. (f5iij) ;
 Glycerini 15 c.c. (f3ss) ;
 Syrupi terebinthinæ (10 per cent.) 75 c.c. (f3iiss) ;
 Aquæ destillatæ 100 c.c. (f3iiss).
 M. Sig.: Three to five tablespoonfuls in the twenty-four hours.

2. EXPECTORANTS.—The reader is referred to the section on these remedies in Part I of this work. The principal members of the group will be merely enumerated here and their dosage recalled:

Sodium benzoate: An eliminant and active liquefacient in doses of 3 or 4 grams (45 to 60 grains) a day.

Ipecacuanha: An excellent expectorant in doses of 0.1 to 0.3 gram ($1\frac{1}{2}$ to 5 grains) a day; especially useful in the form of *Dover's powder*, which contains 10 per cent. each of ipecac and opium.

Potassium iodide: Unquestionably a liquefacient and expectorant in doses of 0.25 to 0.5 gram (4 to 8 grains) a day; it tends to produce hyperemia and can be recommended in sluggish disorders of the respiratory tract, but its use is attended with risk and demands caution in conditions with irritability and a tendency to congestion, and especially in cases subject to hemoptysis.

Sulphurated antimony or kermes mineral: Expectorant, nauseant; insoluble in water and in alcohol; dose, 0.1 to 0.5 gram ($1\frac{1}{2}$ to 8 grains) a day.

Potassium antimonate or "white oxide of antimony" (*not* antimony oxide): Expectorant and anodyne in daily amounts of 4 to 6 grams (1 to $1\frac{1}{2}$ drams); use largely confined to children.

3. SULPHUR PREPARATIONS.—What is the exact mode of action of the sulphur preparations in chronic bronchitis? Do they antagonize the germs? Exert a favorable action on the bronchial cells? Produce a substitution effect on the chronic inflammatory process? These questions we cannot answer.

For clinical purposes, the sulphur compounds rank with the balsams as the drugs acting most strongly in the relief of bronchial catarrh.

They are used mainly by *humage* (direct inhalation in cabinets at

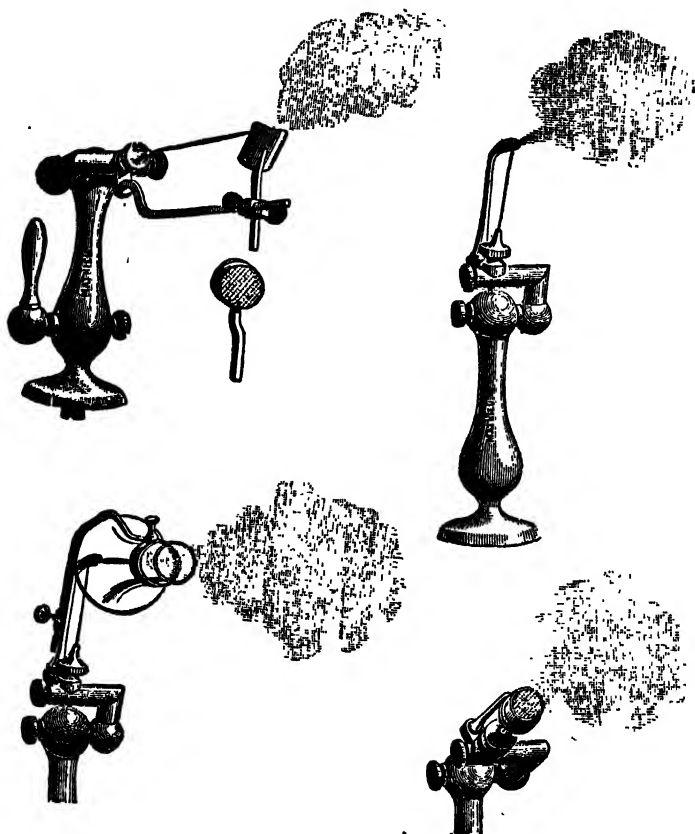


Fig. 248.—Devices supplying vapors, either warm (operated by steam) or cold (operated by compressed air).

thermal resorts) and by *ingestion*; in the latter instance, their action is exerted during exhalation. These two modes of administration may, of course, be combined.

Humage consists essentially in inhalations carefully regulated as to duration, temperature, and the concentration of the sulphurous solution. It is carried out almost exclusively at thermal sulphur water resorts, in special rooms into which the vapors are discharged at a

precisely regulated temperature and with an adjusted concentration of sulphide or sulphur fumes.

For these systematic treatments, which are not feasible in the patient's home, may be substituted *gargling* or the use of the *nebulizer*, e.g., Richardson's apparatus, using either sulphurous waters shipped directly from the springs or an artificial sulphur water, such as:

℞ Sodii sulphatis exsiccati 1 gram (gr. xv);
 Calcii sulphidi crudi pulveris 4 grams (ʒj);
 Sodii subcarbonatis pulveris 6 grams (ʒiiss).

M. bene et div. in chart. No. 1.

Sig.: Mix one powder in a glassful of warm water for gargling, spraying or ingestion.

By the oral route one may administer:

(a) *Flowers of sulphur* [*Sulphur sublimatum*, U. S. P.], one teaspoonful in the morning, mixed with honey (forming a laxative combination). Or, the following cachets may be ordered:

℞ Sulphuris præcipitati,
 Pulveris ipecacuanhæ et opii 0.1 gram (gr. iss);
 Antimonii sulphurati (N. F. IV) 0.3 gram (gr. v).

Pt. cachet. No. i. Da tal. No. xxx.

Sig.: Four to eight cachets a day.

(b) *Sodium sulphide* in a solution or syrup in doses of 0.02 to 0.06 gram ($\frac{1}{3}$ to 1 grain) a day, e.g.:

℞ Sodii sulphidi 0.1 gram (gr. iss);
 Syrupi picis pini (1 per cent.) 120 c.c. (ʒʒiv).

M. Sig.: One tablespoonful or more morning and evening.

Or:

℞ Sodii sulphidi (cryst.) 0.1 gram (gr. iss);
 Aquæ destillatæ 1 c.c. (m xvj);
 Syrupi 75 c.c. (ʒʒiiss).

M. Sig.: Two to four tablespoonfuls a day. (This syrup should be taken within a short time after its preparation.) (POUCHET.)

(c) *Natural sulphur waters*.—When practicable, ingestion of the natural waters is the procedure of choice. The waters of the cold sulphur springs withstand transportation the best. They may be ingested in amounts ranging from 75 to 150 c.c. ($2\frac{1}{2}$ to 5 ounces) in the morning or afternoon, preferably mixed with an equal volume of hot milk. As the water deteriorates very rapidly when the containers are opened, it should be obtained preferably in quarter-bottles (splits), of which one-half is to be used for gargling and the other half ingested.

The healing, desiccant action of the sulphur compounds is much more pronounced than that of the balsams; not rarely congestive bronchial and pulmonary exacerbations are witnessed during the

treatment, which must therefore be duly supervised. Heart disease, Bright's disease, tuberculosis, neurovascular erethism and a tendency to hemoptysis are at least relative contraindications to the treatment or, at all events, necessitate closer supervision and greater caution.

4. SEDATIVES.—For most of the details concerning these drugs the reader is referred to the sections on cough sedatives in Part I and to the section on *Cough* in the present volume. The principal agents used for sedative purposes are the *opiates and their derivatives* (codeine, morphine, ethylmorphine hydrochloride, diacetylmorphine, etc.), *aconite*, *belladonna*, *hyoscyamus*, *cherry-laurel water*, *bromoform* and even chloral hydrate, all of which may be variously combined with the drugs previously referred to. As in the acute forms of bronchitis, narcotics should be used sparingly, and should be employed only to allay useless cough which is not bringing up sputum and is tiring the patient unnecessarily and disturbing his sleep.

The contraindications are bronchial obstruction and a tendency to asphyxia, cyanosis or stupor—frequent conditions in aged subjects, who are the very ones in whom chronic bronchitis is so common.

5. VASO-CONSTRICTORS, stimulating contraction of the smooth muscle fibers, are useful in two ways, *vis.*, as reducers of hyperemia through their vaso-constrictor action and as tonics to the bronchial musculature.

Ergot and *strychnine* are the agents of choice in this connection; under certain circumstances *quinine*, *belladonna* and *ipécac* may be combined with them, as in the following formulas:

℞ Extracti belladonnæ 0.01 gram (gr. $\frac{1}{60}$);
 Quininae hydrobromidi 0.05 gram (gr. $\frac{3}{4}$);
 Extracti ergotæ aquosi (N.F.),
 Terpini hydratis āā 0.2 gram (gr. iij).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: Three pills a day (in bronchial catarrh with subacute exacerbation, slight fever and a tendency to hypostasis).

℞ Strychninae sulphatis 0.0005-0.001 gram (gr. $\frac{1}{130}$ - $\frac{1}{65}$);
 Pulveris ipécacuanhæ et opii,
 Sodii benzoatis āā 0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: Four to six pills a day (in bronchial catarrh with thick secretion which is hard to bring up and a tendency to neurocardiac asthenia).

Fluidextract of hydrastis, in doses of 20 or 25 drops three times a day, likewise exerts a solvent action on mucopurulent secretions which are hard to bring up.

Following are a few formulas of expectorant combinations, subject to numerous modifications according to individual needs:

Pills:

℞ Pulveris ipecacuanhæ et opii,
Benzoini,
Ammoniaci,
Terpini hydratisāā 0.05 gram (gr. $\frac{3}{4}$).

Ft. pil. No. i. Da tal. No. xxx.
Sig.: Three to six pills a day.

℞ Codeinæ 0.01 gram (gr. $\frac{1}{6}$);
Sodii benzoatis,
Terpini hydratisāā 0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xxx.
Sig.: Three to six pills a day.

℞ Codeinæ 0.005 gram (gr. $\frac{1}{12}$);
Extracti belladonnæ 0.01 gram (gr. $\frac{1}{6}$);
Extracti hyoscyami 0.02 gram (gr. $\frac{1}{8}$);
Cynoglossi 0.05 gram (gr. $\frac{3}{4}$);
Terpini hydratis 0.1 gram (gr. iss);
Benzoini q. s.

Ft. pil. No. i. Da tal. No. xxx.
Sig.: Four pills a day.

Cachets:

℞ Codeinæ 0.01 gram (gr. $\frac{1}{6}$);
Terpini hydratis 0.1 gram (gr. iss);
Thiocol 0.5 gram (gr. viiss).

Ft. cachet. No. i. Da tal. No. xxx.
Sig.: Three to six cachets a day.

Mixture:

℞ Spiritus ammoniæ anisati (N.F.) 4 c.c. (f3j);
Sodii benzoatis 6 grams (5iss);
Syrupi codeinæ (N. F. IV),
Syrupi terebinthinæ (10 per cent.),
Syrupi senegæāā 45 c.c. (f3iss).

M. Sig.: Three or four tablespoonfuls in the twenty-four hours.

Enema:

℞ Creosoti 2-4 c.c. (f3ss-j);
Vitelli 2;
Mucilaginis althææ (20 per cent.) 200 c.c. (f3vj).

M. Sig.: To be used as an enema.

Hypodermic injection:

(1) ℞ Eucalyptolis 20 c.c. (f3v);
Olei amygdalæ expressi sterilisati 80 c.c. (f3tiss).

M. Sig.: One to four injections of 2 c.c. (32 minims) each in the twenty-four hours.

(2) ℞ Creosoti 10 c.c. (f3iiss);
Olei olivæ sterilisati 150 c.c. (f3v).

M. Sig.: Five to 20 c.c. (1¼ to 5 fluidrams) to be injected slowly once a day.

There is available, as will have been noticed, a considerable list of remedies of various sorts which may be employed, combined and alternated with nice judgment according to the morbid condition present.

Certain clinical as well as pharmacologic features will facilitate their application in the individual case. Following are the rules by which I am generally guided and which may prove of some interest and service:

1. As for the *balsams*, and in particular terpin hydrate, it may be put down as a fact that in small doses (0.2 to 0.6 gram—3 to 10 grains) the last-named drug increases and liquefies the bronchial secretion and that in large doses (0.8 to 1 gram—12 to 15 grains) it dries it up. The balsams in small doses may therefore be prescribed where secretion is scanty, adherent and hard to bring up; in large doses, on the contrary, in the event of copious secretion, "bronchorrhea," or purulent expectoration in large amount.

2. As for the *expectorants*, the old subdivision of these drugs into the solvents and the irritants was justified. The first group, comprising the *ammonia compounds* and *potassium iodide*, possess the property of liquefying the secretions; they are the *expectorants for cases with dry râles*. The second group, *ipêcac* and *sodium benzoate*, induce an evacuating cough, and are the *expectorants for cases with moist râles*.

3. The *sulphur compounds* are the most powerful, but also the most violent and dangerous agents of the series. They are especially suited for unusually sluggish, torpid, obstinate cases of bronchitis, with slight or no reactions, and in the absence of cardiac, renal or congestive complications.

4. The *sedatives* should be used only where frequent, refractory, useless cough constitutes *per se* an annoying symptom which must be controlled.

5. The *vaso-constrictors* are nearly always indicated, more particularly in weak patients with difficulty of expectoration and a tendency to hypostatic congestion and pulmonary edema.

6. *There is generally advantage:*

(a) In combining these different kinds of remedies;

(b) And even greater advantage in alternating them: In an initial period, the balsams and expectorants; in a second period, the sulphur compounds, sedatives and vaso-constrictors being combined with these according to indications.

7. In aged bronchitic, catarrhal subjects, with paroxysmal cough at night, causing sleeplessness, it may be useful to prescribe two mix-

tures—one for the night, mainly sedative, and the other for the daytime, mainly expectorant, as in the following example:

(A) \mathcal{R} Extracti opii (N. F.) 0.2 gram (gr. iij);
 Sodii benzoatis 3 grams (gr. xlv);
 Syrupi terebinthinæ (10 per cent.),
 Syrupi toluāā 75 c.c. (f̄3iiss).
 M. Sig.: For use at night.

(B) \mathcal{R} Sparteinæ sulphatis 0.15 gram (gr. iiss);
 Potassii iodidi,
 Sodii benzoatisāā 3 grams (gr. xlv);
 Syrupi codeinæ (N. F. IV),
 Syrupi terebinthinæ (10 per cent.),
 Syrupi toluāā 45 c.c. (f̄3iiss).
 M. Sig.: For use in the daytime.

* * *

CLIMATIC AND MINERAL SPRING TREATMENTS.—The selection of a resort for the treatment of cases with chronic expectoration should be based on the general features of the cough, the amount of sputum, and how the patient is likely to react.

If the cough is moderate, catarrh pronounced, expectoration relatively easy, and the patient free of any marked tendency to lung congestion or irritation, a sulphur antieatarrhal cure (as exemplified in France by such resorts as Luchon, Cauterets, Eaux-Bonnes, Allevard, Engghien, Saint-Honoré) [see also Vol. I: *Crenotherapy*] may be recommended for the *summer*, and for the *winter*, residence in one of the relatively dry, warm, well protected resorts (Riviera).

If the cough is paroxysmal and tiring, expectoration relatively difficult, and the patient shows a tendency to crethism or congestion, an arsenical cure (Mont-Dore) may be recommended for the *summer*, and for the *winter*, residence in a relatively moist, warm, equable, sedative climate.

* * *

In concluding, mention will be made of three measures which are of some utility in the treatment of expectoration—the first one, commonly overlooked; the second, gradually attracting attention after a prolonged period of desuetude, and the third, requiring the intervention of a specialist, and therefore to be reserved for serious forms of expectoration (bronchiectasis, fetid bronchitis, severe asthenia, etc.).

REDUCTION OF THE FLUID INTAKE exerts a pronounced effect on the copious expectoration in chronic bronchitis. Schroth's treatment along this line undoubtedly yields appreciable results.

It is carried out as follows: Gradual reduction of the intake of fluids to a total of 600, 300 and 200 c.c. (20, 10 and $6\frac{1}{2}$ ounces), this amount including the water, soups, milk, coffee, etc. Out of every four days three are dry days, in conformity with the foregoing regulation, while the fourth is a drink day (*Trinktag*). In mild cases the patient may take fluids *ad libitum* on the fourth day; as a rule, the amount permitted is 1200 to 2000 c.c. (48 to 68 ounces). Wine is the beverage of choice. To relieve thirst, a few slices of lemon or orange are given.

Aside from the above fluid restriction, the diet is liberal, with plentiful use of vegetables, fruits, compotes and articles rich in water, so that the actual reduction of fluid intake will not be too severe.

It seems unnecessary to emphasize the risks attending this treatment in renal cases and in tuberculosis.

It is well to keep in mind, however, the favorable anti-expectorant influence of reduction of fluids. I have often had occasion to observe its excellent effects in chronic, copious bronchorrhea.

INTRATRACHEAL INJECTIONS.—This is a very old procedure—which I remember personally practising with Hamaide in 1895 at the Lariboisière Hospital—and which is returning into use after a long period of probably unwarranted oblivion. (See Vol. I: *Therapeutic Procedures*).

Whatever may be said to the contrary, it is a somewhat difficult procedure, which requires on the part of the physician at least some practice in laryngology and on the part of the patient actual docility and self-control to avoid the spasmodic contraction of the vocal cords and the paroxysm of cough, sometimes distressing, which follow the injection. The subject should train himself to breathe quietly and deeply before and during the injection and to stop breathing for a few seconds immediately after.

The fluids so far chiefly used have been 5 or 10 per cent. *oily solutions of gomenol, eucalyptol or camphor*, injected in doses of 1 to 5 cubic centimeters. (15 to 75 minims) or more, according to tolerance.

The resulting change in the expectoration is often pronounced: There is diminution of amount and purulency, with consentaneous lessening of cough and fever.

This is a measure which should not be forgotten in pulmonary tuberculosis and particularly in chronic bronchitis.

ENDOBRONCHIAL TREATMENT.—Endobronchial treatment of chronic bronchial affections yields extremely encouraging results in patients suffering from bronchiectasis, true abscesses, or scattered

gangrenous foci. It practically amounts to a local medicinal treatment through a double current sound introduced under bronchoscopic control, which permits of irrigation of the disease focus with an antiseptic solution, followed by withdrawal of the latter (procaine, adrenalin, silver nitrate in 0.15 to 0.6 per cent. solutions, oil of turpentine in oily solution or an aqueous emulsion of 0.3 per cent. strength, or a weak iodine solution).

This procedure, which obviously can be carried out only by a specialist, should be repeated at varying intervals according to the amount of suppuration, the number of disease foci, the odor of the expectoration and the results obtained.

FAINTING (SYNCOPE).

[From σύν, with, and κόπτειν, to cut.]
Faintness, fainting spell.

Two grades of **syncope** may occur :

Ordinary *fainting* or *lipothymia*, with incomplete loss of consciousness, faintness accompanied by pallor and cold perspiration, but without actual arrest of the heart. [This is the accepted meaning of the word "syncope" in the United States, but the French recognize also a more severe type, with pronounced circulatory depression.—Tr.]

Severe *syncope*, characterized by complete loss of consciousness, an extremely small pulse or even cardiac arrest, and associated vasomotor and secretory disturbances (pallor of the face and lips, cold perspiration, lowered temperature of the extremities, etc.) imparting to the condition the superficial appearance of death.

FAINTING (LIPOTHYMIA).—This condition is readily dispelled by certain simple measures :

1. *Recumbency with the head low* and the legs, if need be, markedly elevated, either manually or by means of some supporting object such as a pillow, chair, armchair or wall. This measure is generally all-sufficient, restoring to the brain the blood which it lacked.

2. Removal of all causes of constriction of the neck, chest or abdomen, by taking off or loosening the collar, tie, corset or belt, so as to do away with all impediments to respiration.

3. Flagellation of the face with a cloth dipped in cold water; inhalation of some fluid calculated to irritate the nasal mucosa (ether, acetic acid, ammonia or smelling salts), stimulation of the skin by rubbing, mustard applications or other mechanical or thermal stimulating procedure, in order to stimulate reflexly the cardio-respiratory centers in the medulla.

4. If necessary, an injection of camphor in oil or of caffeine (this is rarely required).

5. As soon as the patient is able to swallow, ingestion of a few mouthfuls of some stimulating fluid (coffee, grog, hot wine, syrup of ether, or a solution of ammonium acetate).

In patients prone to fainting spells, I simply give the following directions :

In the event of faintness, lie down with the head low and take a few swallows of the following:

R Ammonii acetatis	4 grams (5j);
Spiritus vini vitis	20 c.c. (f5v);
Syrupi aetheris (2 per cent.)	30 c.c. (f5j).—M.

SEVERE SYNCOPE.—The simple procedures mentioned above should, of course, be availed of in this condition, and will sometimes be sufficient; but often the situation is more critical, and more energetic measures are necessary.

1. The patient should be placed in a more or less pronounced inverted posture, with the head low.

2. The reflex stimuli applied should be more severe, *e.g.*, intermittent malaxation (kneading type of massage) of the abdomen, very hot stimulating applications over the precordium, vigorous rubbing of the skin, etc.

3. Stimulant hypodermic injections: Pure ether, camphor in oil, strychnine, caffeine.

If the condition becomes at all alarming recourse should be had without further delay to the two really specific measures for syncope:

1. *Rhythmic traction on the tongue.*

2. *Artificial respiration.*

Finally, in really desperate cases, *cardiac massage* could be tried, either through the opening afforded by making a flap in the chest-wall, permitting of direct rhythmic massage of the heart by the hand, contracting over the heart rhythmically, or after a supra-umbilical laparotomy, permitting of massage through the diaphragm. This last procedure is, obviously, indicated particularly where the condition occurs in the course of an abdominal operation.

One might also try *faradic stimulation of the pectoral muscles*, which may be described as follows: Have the patient's arms raised behind his head and apply the electrodes to the outer thirds of the right and left pectoral muscles, respectively. Faradic stimulation of sufficient intensity will cause a deep inspiration; this movement having been obtained, the current is stopped by simply lifting off one of the electrodes, thus breaking the circuit. The resulting expiration may be assisted, if need be, by making pressure over the ribs. The electrode is then replaced, causing another inspiration, then lifted off again, and so on until spontaneous breathing returns, which can then be further stimulated by one of the procedures previously described.

[*Adrenalin in physiologic salt solution*, given intravenously, would be a serviceable measure.—Tr.].

CERTAIN SPECIAL FORMS OF SEVERE SYNCOPE.—

Chloroform syncope [collapse under chloroform], one of the most serious forms one is called upon to witness and treat, mainly requires *immediate artificial respiration* and *rhythmic traction on the tongue*, and if the condition is really grave, *cardiac massage*, since these are cases in which all conditions for the proper performance of the procedure are combined, *vis.*, a suitable operative armamentarium and the presence of a surgeon.

Intravenous or intracardiac injection of 1 or 2 cubic centimeters of an isotonic 1 : 1000 solution of *adrenalin* is a measure still under discussion. [The risk from this procedure appears to be much greater in chloroform collapse than elsewhere.—Tr.]

Faradic stimulation of the pectoral muscles could only be of service as an auxiliary measure.

Post-hemorrhagic syncope demands mainly elevation of the lower extremities, suspension of the body by the limbs with lowering of the head, external heat, and particularly, injection of physiologic salt solution at body temperature hypodermically or, much better, intravenously. Intravenous injection of adrenalin may also be strongly recommended. Later, medication to accelerate blood formation should be instituted.

In the **syncopal attacks of Stokes-Adams' disease** (slow pulse, paroxysmal bradycardia), the results of treatment are very uncertain. Inhalations of *amyl nitrite* or of *ethyl chloride* seem to exert some effect. Artificial respiration, rhythmic traction on the tongue, faradic stimulation of the pectoral muscles and intravenous injections of adrenalin would be indicated in severe attacks.

Syncope in thoracentesis or abdominal tapping is avoided by evacuating the fluid in the pleura or abdomen neither too completely, nor too late, nor too quickly. If syncope does occur, it should be treated like ordinary fainting spells. In a pusillanimous patient, a preliminary injection of camphor in oil, or of the total alkaloids of opium (pantopon, etc.), or of both these preparations in combination, could be administered.

FEVER.

[Febris, from *φέβομαι*, to tremble.]

I.—ANTIPYRETIC MEDICATION.

The treatment of fever is subject to that moot question:

Should fever be combatted? This question will seem paradoxical to some practitioners. Yet a little thought upon the matter will show that even now it is still very difficult to give a definite answer to the question, and that the course to be followed depends on the kind of case and the attendant circumstances.

The two extreme viewpoints have been represented, on the one hand, by Fages and the Montpellier school, teaching that fever is a wholesome defensive reaction against disease, which must be allowed to go unchecked, and that in the infectious diseases, "the entire art of the enlightened physician consists in knowing how to make use of fever," * and on the other hand, by Liebermeister and the Vienna school, exaggerating the dangers of fever and denouncing it *per se* as a harmful condition always to be combatted.

In spite of the many experimental investigations brought out in support of each viewpoint, no absolute and distinct conclusion concerning this question can be formulated, the results obtained being contradictory.

Most clinicians, I believe, will at the present time endorse the following independent statement: *Fever is a defensive reaction, salutary per se, but which may become a source of danger through its duration or its intensity, or in particular, by reason of the accompanying disturbances.* As expressed in Grasset's practical dictum: "It must be let alone usually, treated sometimes, induced rarely, and watched always."

In other words, while it is always advisable to combat the source of the fever, *i.e.*, the causal infection, by effectual measures (quinine in

* Attention has frequently been directed to the dedication which appears on Fages' thesis, entitled: "*Recherches pour servir à l'histoire critique et apologétique de la fièvre*," 1820:

FEBRI
FILII GRATI
PRO
PATRE OLIM MALE AFFECTO
ET
PER EJUS BENEFICIUM
SANATO.

malaria, antitoxin in diphtheria, sodium salicylate in rheumatism, etc.), the fever itself should not be combatted unless the temperature is very high (40°C. — 104°F. —or above), or fever continues too long (two weeks and more) or is accompanied by serious manifestations such as delirium, restlessness, fainting spells, etc.

Leaving aside all theory, the measures available for reducing the temperature in fever are represented by the following two groups:

(a) *Application of cold*, comprising essentially the various forms of *antipyretic hydrotherapy*.

(b) *Antipyretic drug treatment*.

HYDROTHERAPY is one of the simplest and most varied and easily adjusted therapeutic proceedings at our disposal, and likewise one of the most effective and harmless, provided it be applied carefully in a gradually increasing, rational dosage appropriate for the individual case, with careful observation of the reaction of the patient, and not according to a narrow, inflexible and dogmatic plan such as the much-discussed Brandt treatment for typhoid fever. Here there should again intervene the perennial axiom of clinical wisdom: Let theory and dogma, the disease and its picture, not cause the physician to lose sight of concrete reality, the disease and its attendant vital reactions.

Many different forms of hydrotherapy may be made use of (see the separate section on *Hydrotherapy*).

Considering only the most serviceable antipyretic applications, we may mention:

General sponging, a mild procedure indicated especially where some serious complication (phlebitis, hemorrhage, tendency to collapse) contraindicates the more active hydrotherapeutic measures.

Affusions with a large sponge or watering can, with the patient lying on a waterproof sheet and proper provision made for reception of the water as it runs off.

Packs, local or general (chest, abdomen, chest and abdomen, or general), with a wet sheet.

This measure, which is, on the whole, very effective, is of the greatest service when extensive moving of the patient would be attended with risk to the heart or on account of a poor general condition, but hydrotherapy is nevertheless indicated.

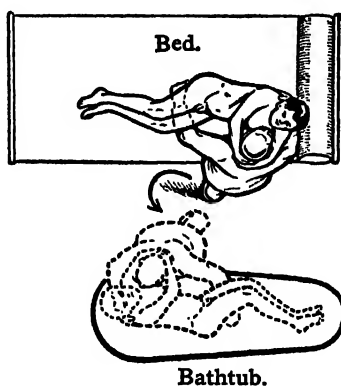
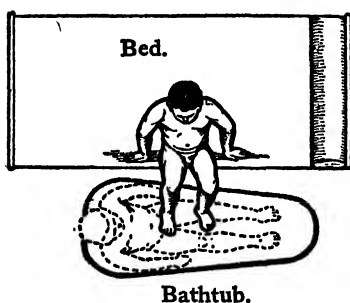
These several applications may, according to the temperature indications and individual reactions, be carried out either with cold water (22°C. — 71.6°F. —or lower), cool water (22 to 30°C. — 71.6 to 86°F.), tepid water (30 to 34°C. — 86 to 93.2°F.), or warm or hot water (36 to 40°C. — 96.8 to 104°F. —or higher).

Their duration should likewise vary according to the reaction observed.

Baths.—Baths occupy a very important position in the treatment of febrile diseases. Extensive investigations have been carried out in this connection.

Two kinds of baths are mainly in use for antipyretic purposes:

1. *The Gradually Cooled Bath.*—The initial temperature of the bath is a few degrees (generally 2 to 5° C.—3.6 to 9° F.) higher than that of the patient; it is then gradually reduced by addition of cold water to a much lower level (30 to 20° C.—54 to 36° F.—lower, according to many writers, but “according to indications” seems a better way of expressing it).



Figs. 249 and 250.—Procedure in the administration of a bath in a febrile case.

1. The patient is able to exert himself, and gets into the bathtub by his own efforts.

2. The patient is unable to move about. Relative positions of the bed and bathtub. Manner in which the attendant turns and deposits the patient in the tub.

2. *The Cold Bath.*—An example of this procedure is the plan formulated by Brandt and long upheld by the Lyons school: Baths of ten to fifteen minutes at 15 to 18° C. (59 to 64.4° F.) every three hours, day and night, whenever the rectal temperature reaches or exceeds 39° C. (102.2° F.).

For further details the reader is referred to the separate section on *Hydrotherapy*. It may be well here to recall briefly, however, the usual features of the reaction of a febrile case to the cold bath.

The immersion in the bath (at a temperature 20 to 25° C.—36 to 45° F.—lower than that of the patient) causes an extremely unpleasant sensation of cold, generally accompanied by mental distress and even terror, with shivering, chattering of the teeth, restless movements and verbal complaint. The patient then becomes accustomed to the bath in about $\frac{1}{2}$ to 2 minutes, the restlessness subsides, calm is re-

stored, and even a feeling of well-being is experienced which persists for a variable time—five to fifteen minutes—after which a deep-seated feeling of cold again sets in, with marked shivering and chattering teeth. This is the clinical indication for withdrawal of the patient from the bath: "This is the moment," writes Arnozan, "when the internal temperature, previously maintained at its original level or even slightly above it, begins to descend."

The patient, having been taken out of the bath, is put back in his bed and carefully wrapped in a woolen blanket, with a hot-water bag at his feet. A drink of some hot aromatic, stimulating beverage, containing a little alcohol, is administered, whereupon the patient will often become drowsy, experiencing a sense of relaxation and improvement which persists for one to three hours or more, according to the clinical type and the individual concerned.

The effects of the bath in the fever case extend much further, however, than the mere antipyretic action. Systematic bathing allays the nervous symptoms, tones up the heart, stimulates respiration, promotes diuresis, facilitates the elimination and oxidation of metabolic wastes and various toxic materials, and produces a tonic and stimulant effect on the entire system. Hydrotherapy is, as Grasset expresses it, *the best of the antipyretic agents, and better still, is the best antagonist to infection among the antipyretic agents.*

Prolonged cold or ice applications over a portion of the body (abdomen, heart, forehead) sometimes constitute a very serviceable form of *frigotherapy*. Renewed application of cold compresses, and particularly the continuous application of an ice-bag over the abdomen, and better still over the precordium, are powerful antipyretic measures. The ice-bag over the precordium acts, from the antipyretic and heart-tonic standpoints, in a manner quite comparable to the cold bath. The method is capable of giving valuable service in cases in which, for some reason, baths are impracticable or contraindicated (see *Crymotherapy*).

Cold enemas, or better, *cool* enemas (18 to 23° C.—64.4 to 73.4° F.) and *internal balneation* by copious drinking of fluid are interesting adjuncts of the foregoing hydrotherapeutic modalities.

"Thus it is seen," writes Grasset, "that one is compelled to discard the initial interpretation which some of Brandt's pupils expressed in connection with the treatment of typhoid fever when they stated that all that was required for the treatment of this disease was a thermometer and the giving of a bath whenever the temperature reached a certain level.

"Water, in the acute infections, affords a graded series of therapeutic procedures, the manipulation of which requires some experience. The result sought, however, is in all cases a regulating effect on the temperature, the elimination of poisonous materials and

wastes, stimulation of the circulation and of the normal processes of oxidation, restriction of proteolytic processes, and regulation of the nervous system in its antixenic function for the nutritive process."

Indications for Hydrotherapy.

Typhoid fever (*q.v.*) is the classic indication for hydrotherapy. There is no doubt that the case mortality from this disease has been considerably reduced by the cold bath treatment, intelligently applied and with due regard to contraindications.

Pneumonia and Bronchopneumonia.—The prevailing opinion in France seems to be as follows:

1. In pneumonia and bronchopneumonia in adults, cold baths constitute an exceptional measure to be reserved for severe and complicated cases (delirium, coma, convulsions) without uremia or accompanied by a persistent and dangerous hyperthermia.

2. In bronchopneumonia in the child, warm baths (38° C.—100.4° F.) constitute a very good treatment.

3. In both children and adults, repeated moist packs of the chest are always worthy of recommendation, in pneumonia as well as in bronchopneumonia.

Cerebral Rheumatism.—Aside from cases complicated by pericarditis with effusion or infectious or malignant endocarditis, it may almost be said that this condition is always an indication for the gradually cooled bath. Hyperpyrexia and delirium are the principal indications for the procedure. The technic for a bath at 30° C. (86° F.) to be progressively lowered to 25 or 20° C. (77 or 68° F.) is described by Arnozan as follows: "In the event of a severe chill with threatened syncope, the patient is withdrawn and given an injection of camphor in oil. Otherwise, the patient is kept in the bath for a period of time sufficient to lower his temperature to 38.5° C. (101.3° F.), Upon removal from the bath, he is wrapped in a sheet and a blanket made ready for the purpose on his bed. The temperature should be taken every two hours or even hourly." If the rectal temperature rises above 39° C. (102.2° F.), another bath is administered.

Hydrotherapy has been employed as an *exceptional* measure in the eruptive fevers, influenza and erysipelas. The main indications for it are hyperpyrexia, inflammatory complications and delirium.

Contraindications.—Pleurisy, pericarditis with effusion, endocarditis with poor compensation, pronounced myocardial degeneration, phlebitis, appendicitis, intestinal hemorrhage, nephritis, pulmonary tuberculosis, and nervous excitement are almost absolute contraindications to *cold baths*.

Tepid baths may, on the other hand, be of service in most of these conditions, with the exception of the abdominal disorders (appendicitis, peritonitis, hemorrhage, etc.), in which absolute immobilization is imperative. The great utility of the ice-bag under these circumstances is, however, well known.

PHARMACEUTIC ANTIPYRESIS.—All necessary information regarding the antipyretic drugs will be found in the section on *Antipyretics* in Part I of this work. Only the simplest classification of these drugs will be given here.

1. *Antipyrin and its derivatives* [amidopyrin, amidopyrin butylchloralhydrate (trigemin), salipyrin].
2. *Aniline derivatives* (acetanilid, acetphenetidin, exalgin, lactophenin).
3. *Quinine and its derivatives* (various quinine salts).
4. *Sodium salicylate and its derivatives* (acetylsalicylic acid, salipyrin, salophen, saloquinine, etc.).

The relative indications for different antipyretics are not an inconsequential matter.

The antipyretic drug used in any given case should be that one which is appropriate for the clinical condition present.

Thus, *malaria* requires the selection of *quinine*.

Rheumatic fever indicates the use of *sodium salicylate* or acetylsalicylic acid, or, if necessary on account of severe and obstinate pain, antipyrin or the combination of antipyrin with sodium salicylate. **Typhoid fever** only exceptionally requires the use of an antipyretic drug, where hydrotherapy is attended with difficulties or is impossible. *Quinine* is the least harmful drug in this event. In **tuberculosis**, antipyretics usually induce disastrous secondary effects (sweats, collapse, depression, etc.); they (amidopyrin, guaiacol) should be used, therefore, only in the presence of exhausting fever accompanied by secondary manifestations (headache, diffuse pains, depressions, etc.) which are really intolerable. Quinine is rather a tonic remedy, but has no effect on the fever of tuberculosis. In the brief febrile movements of **tonsillitis**, **influenza**, etc., antipyrin, acetylsalicylic acid and quinine are generally the most suitable agents.

Generally there is advantage:

1. In combining antipyretic drugs, such as quinine, antipyrin, sodium salicylate, exalgin, acetphenetidin, etc. Their action is enhanced by such combination.
2. In alternating them, in the presence of protracted fever, in order to avoid habituation.
3. In combining with them a small amount of caffeine, in order to counteract their depressant action on the heart.

On the whole, I look upon their use merely as a necessary evil, and fully endorse the conclusion expressed by Schmitt at the Congress of Bordeaux as long ago as 1895: "As antipyretics, or rather as antihyperpyretics, these drugs are capable of exerting a favorable effect in some cases, but in the majority of cases they are useless and even dangerous."

II.—PROTHERMIC MEDICATION.

Along with the treatment of fever, it is not inappropriate to mention the converse form of medication, which consists in **stimulating heat-production**. The indications for such treatment, while much less common than those for antipyretic measures, nevertheless present themselves:

1. In conditions of lowered temperature, the algid state and collapse, in which the various procedures for the application of external heat [hot-water bags, hot blankets, rubs, hot moist packs (42° C.—107.6° F.), hot baths (39-40° C.—102.2-104° F.), hot air douches, etc.] may be more or less judiciously combined with internal measures to increase heat production (hot drinks, diffusible stimulants, alcohol, ether, ammonia preparations, camphor in oil, caffeine, etc.). Such treatment may properly be termed *thermotherapy*.

2. In the cases, not as yet clearly specified, in which it may be deemed useful to secure a febrile reaction in a system which is otherwise incapable of developing one. This idea is by no means a new one, as illustrated in artificial abscesses and inoculations of streptococci in lupus. The term *pyretotherapy*, suggested for the procedure by Titus Konteschweller (*Thèse de Paris*, 1918), seems acceptable.

The **pyretogenic agents** so far used comprise:

Inoculations of streptococci and of *B. prodigiosus* in lupus of tuberculous origin (Roger and Hallopeau).

Intramuscular, and especially, intravenous injections of colloidal metals, now frequently used in the course of febrile states.

Intravenous injections of sodium nucleinate in doses of a few milligrams up to 0.01 gram ($\frac{1}{16}$ grain), or of neoarsphenamin.

Injections of serums of any sort, which very often raise the temperature, especially in tuberculous cases.

Autohemotherapy, which likewise causes a slight rise of temperature.

The indications for pyretotherapy are not as yet well-defined. Konteschweller makes the following assertion, which seems, however, to be a little too broad: "Fever acts favorably in the majority of affections, alike in the acute infectious diseases and in certain chronic disorders."

Pulmonary tuberculosis is an absolute contraindication to it, and cardio-pulmonary conditions that cause dyspnea a relative contraindication; some fatal cases have been encountered in the course of serious infections, especially in typhoid fever.

The question has not been sufficiently worked out to warrant general application of the method. The treatment is one which is still in process of development.

FREQUENT PULSE.

I. Temporary. Accidental.

Febrile: Treatment of the existing fever.

Exertion: Rational adjustment of exercise to individual capacity.

Orthostatic: The wearing of an orthoplastic abdominal belt.

Nervous: Systematic hydrotherapy.

Algie: Analgesic medication.

Toxic: Interdiction of tea, coffee, caffeine, kola, theobromine, tobacco, etc.

II. Paroxysmal (tachycardia).

Rest.

Restricted diet.

Measures to be tried:

Ice-bag over the precordium.

Ingestion of large cachets of absorbent powders.

Compression of the abdomen.

Compression of the eyeballs for two or three minutes (oculocardiac reflex).

Deep inspirations followed by prolonged expirations.

Medication: Nauseants (ipecac in fractional doses, tickling of the pharynx with the finger), digitalis or strophanthus.

III. Permanent.

Of cardiac origin: Partial or complete heart-failure.

Heart treatment: Rest, diet and digitalis.

Digitalis is almost a specific in tachycardia with irregularity.

Quinidine frequently gives interesting and sometimes impressive results in auricular fibrillation.

Of sympathicothyroid origin: Graves's disease and tachycardiac neurones (see *Graves's disease*).

GLANDULAR ENLARGEMENTS.

In conformity with prevailing clinical classifications, the **glandular enlargements** may be divided, for practical purposes, into five clinico-etiological groups which lend themselves fairly well to a collective therapeutic summarization.

(a) **FIRST GROUP: Simple glandular enlargements, painless polyglandular involvements, simple lymphadenitis.**—These seem almost *certain to be of infectious origin*, and may be subdivided into:

(1) *Syphilitic glandular enlargements*, primary (chancre satellites) or secondary. **The treatment merges with that of syphilis (*q.v.*).**

(2) *Tuberculous glandular enlargements*, or tuberculous lymphadenitis, so common in children that some have maintained that none, or almost none, escape it and that this “stage” of tuberculous lymphadenitis is the very thing which later confers on adults their relative immunity to the disease, through a process of auto-vaccination. **The treatment merges with that of lymphatism.**

(3) *Cryptogenic glandular enlargements*, the exact nature of which is unknown to us; *infectious glandular enlargements*, especially frequent in children. Formerly, these conditions were ascribed to scrofula, but the later knowledge of tuberculosis partly destroyed this diathetic conception. There does nevertheless exist in some subjects a special constitutional state which renders them more susceptible both to glandular involvements and to local tuberculous processes, as well as to infections of various sorts, manifested in blepharitis, impetigo, coryza, tonsillitis, otitis, chilblains, etc. For lack of a better term, and until further information is forthcoming, this morbid predisposition may be called *lymphatism*. This constitutional deficiency can be combatted, corrected and remedied, and its treatment will be discussed below, under *Treatment of Lymphatism*.

(b) **SECOND GROUP: Inflammatory glandular enlargements, painful adenopathies, polyglandular and with or without suppuration.** These are the cases of *septic adenitis* secondary to a localized infection. *Their treatment is essentially that of the cause, e.g., treatment of the furuncle, carbuncle, septic genital ulceration, infected wound, erysipelas, dental abscess, or other condition to which they are due.*

(c) **THIRD GROUP: Caseous adenopathies** (glandular softening). These are generally the result of *tuberculous lymphadenitis*. The treatment, more surgical than medical, is of sufficient importance in every day practice to warrant a short, separate section on it: *Treatment of Tuberculous Adenitis in the Stage of Softening*.

(d) **FOURTH GROUP: Hard, nodular, scirrhus adenopathies.**—These are, as a rule, *secondary neoplastic glandular involvements*. Their treatment can be covered in a few lines:

Either they are movable and can be completely excised: *Excision is necessary*.

Or they are adherent and cannot be removed: *The X-rays and radium can alone be of some benefit*.

(e) **FIFTH GROUP: Apparently primary neoplasms of the lymphatic and adenoid tissues.**—This comprises the various lymphomas, lymphadenomas, and lymphosarcomas with or without leukemia. Their treatment is deserving of some discussion: *Treatment of the Primary Lymphadenopathies*.

Thus, when the whole field is canvassed, it seems clear that, for practical purposes, three sections in particular demand our attention in the treatment of the glandular conditions:

I. Treatment of "lymphatism" (constitutional predisposition to gland enlargements).

II. Treatment of tuberculous adenitis in the stage of softening.

III. Treatment of the primary lymphadenopathies.

I. TREATMENT OF LYMPHATISM.—Whatever view one may entertain regarding the exact nature of lymphatism (or the lymphatic diathesis or constitution), the results of centuries of clinical experience in its treatment may be condensed as follows:

I. Progressive "Hardening" or "Building-up" Treatment.—(a) If possible, especially during childhood: *Life in the country, in the mountains, or still better, at the seaside*—the great upbuilder of lymphatic individuals.

Warm, dry, sunny climates are favorable; cold, damp, misty climates are very unfavorable.

In general, when the individual is already somewhat hardened, a somewhat brisk climate among the seacoast resorts may prove quite suitable; its stimulating effect is remarkable in the sluggish type of case, though the "excitable" cases "flare up" under it.

(b) *Supervised, but substantial and varied diet*: Meats (beef, mutton, pork) broiled or roasted, fowl, fish, brains, eggs, purées of leguminous vegetables, lentils, various cereal flours, especially oats, pastes, green vegetables, water cress, potatoes, salt cheeses, and possibly malt.

beverages. Tea, coffee and the stronger liquors are to be strictly forbidden.

(c) *Systematic and progressive physiotherapeutic measures:*

Daily rubbing with aromatic and alcoholic preparations.

Daily tub baths and douches at gradually reduced temperatures.

Artificial (tub) and actual sea baths.

Sulphur baths. Cold baths, etc.

Carefully regulated sunbaths (see *Heliotherapy*).

Cautious X-ray exposures have sometimes proven effectual (see *X-Ray Therapy*).

II. Medicinal Treatment under Observation.—The time-honored remedies comprise, in the first place, *iodine* and its derivatives, the *arsenicals* and *codliver oil*; as adjunct agents, *iron*, *tannin* and the *colloidal drugs*.

Iodine and its derivatives exert a selective, almost specific action on the lymphatic system. Two kinds of preparations are particularly to be recommended in lymphatic cases.

The *iodide of iron*, which may be prescribed in one or the other of the following forms:

The syrup of ferrous iodide (*Syrupus ferri iodidi*, U. S. P., containing 5 per cent. of FeI_2 ; dose, 1 c.c. (15 minims)], 2 to 4 c.c. (30 to 60 minims).

Blancard's pills (0.05 gram— $\frac{3}{4}$ grain—to the pill), four to six pills daily:

℞ Iodi	4.1 grams (gr. lxij);
Ferri reducti	2 grams (gr. xxx);
Aquæ destillatæ	6 c.c. (f3iss);
Mellis	4 c.c. (f3j);
Altheæ pulveris,	
Glycyrrhizæ pulveris	āā q. s.

Ft. pil. No. c.

Sig.: Four to six pills a day.

[*Pilulæ ferri iodidi*, N. F., each representing 0.06 gram (1 grain) of ferrous iodide. Dose, 2 pills.]

The *iodo-tannic preparations*, which may be prescribed in the form of *Syrupus iodotannicus*, N. F. (iodine, 0.27, and tannic acid, 0.54, in syrup, to make 100), dose, 4 c.c. (1 fluidram), or in the French preparation known as "sirop iodotannique phosphaté," formulated thus:

℞ Iodi	2 grams (3ss);
Acidi tannici	5 grams (gr. lxxv);
Calcii phosphatis (dibasic)	20 grams (3v);
Acidi lactici	q. s.
Aquæ destillatæ	360 c.c. (f3xij);
Sucrosi	640 grams (3xxj).

Ft. sec. art.

Sig.: Two or three tablespoonfuls daily.

Arsenic is to be prescribed in one of its customary forms. Sodium arsenate may be given in pills; potassium arsenite in Fowler's solution; arrhenal (sodium methylarsenate) in doses of 0.05 to 0.1 gram ($\frac{3}{4}$ to $1\frac{1}{2}$ grains) by the mouth or hypodermically, or sodium cacodylate hypodermically. A course of treatment with arsenical waters at suitable resorts might also be given.

The following formula, which combines arsenic, iodide and bromide, is sometimes very useful in the "excitable" type of lymphatic case:

R. Sodii arsenatis	0.03-0.1 gram	(gr. $\frac{1}{2}$ -iss);
Sodii iodidi	1-3 grams	(gr. xv-xlv);
Sodii bromidi	2-10 grams	(ss-iiss);
Syrupi aurantii amari	225 c.c.	(f $\frac{3}{4}$ viiss).
M. Sig.: One dessertspoonful three times daily with the meals.		

"The treatment with **codliver oil** has long enjoyed the confidence of the laity as well as the medical profession; perhaps some reservations should be made with reference to the extreme freedom with which this remedy is prescribed. In scrofulous patients with sound digestive organs, able to digest and assimilate a large amount of fat, surprising results are certainly to be noted from the administration of codliver oil; but as Grancher has remarked many times in his didactic teaching, these results are obtainable only if *massive doses* of the oil are ordered; it is a far cry from the time-honored two spoonfuls which the lymphatic children in some families are made to take during the winter months, to the four, six, ten and fourteen spoonfuls which I have seen taken and digested by some scrofulous subjects and under the influence of which lymphatic engorgements of considerable size melted down and confluent suppurating acne dried up.

"It is at the seaside, in the cold season, and while taking much exercise that children digest the oil the best.

"Aside from these cases in which the child has a remarkable ability to digest fats, only a limited amount of benefit is to be obtained from the oil, and in other children one must look with apprehension upon the hindrance it may offer to feeding by reason of the anorexia and gastro-intestinal disturbances it brings on. The susceptibility of the child to the oil should be tested; if the child stands it well, the drug should be boldly pushed to the largest possible doses; if not, it should be completely discarded.

"Various devices to facilitate its ingestion by children are, indeed, available, such as a special covered spoon, emulsion with various syrups, admixture with beer, washing of the mouth with dilute alcohol before and after, etc. But, as a matter of fact, the children

who are accustomed to this remedy take it readily, and it is almost useless, unless it be with the first few doses, to use so much artifice.

"Addition of creosote to the oil in the ratio of 5 to 20 grams to the liter is distinctly indicated in all cases in which the scrofulous patient exhibits bronchial catarrh." (Le Gendre.)

Iron, tannic acid and calcium salts may be useful; they are preferably to be prescribed, as previously mentioned, in conjunction or combination with the iodine compounds.

By way of leukocytogenic (leucocytosis-stimulating) medication, **colloidal therapy** by inunction or injection may find many indications among infected lymphatic patients who react poorly.

III. Crenotherapy.—The *sodium chloride* or *arsenical waters* are especially indicated.

The mountain resorts should be reserved for the scrofulous subjects with glandular involvement who are but slightly "excitable."

The *seacoast*, ordinarily so beneficial, is contraindicated where there is lung involvement, ocular manifestations (blepharo-conjunctivitis), or excessive nervous irritability.

IV. Is there any advantage in making over the glands themselves *counterirritant* or *supposedly resolvent* applications, *e.g.*, painting with tincture of iodine, applications of brine or of hypertonic iodide-chloride solutions, inunctions or rubbings with iodized vasogen, iodide or mercury dressings, or mercurial plaster? Generally, intermittent use of one of these procedures seems actually to exert a favorable influence.

II. TREATMENT OF TUBERCULOUS ADENITIS IN THE STAGE OF SOFTENING.—Treatment of Suppurative Adenitis of the Neck.—When lymphadenitis of the neck has reached the suppurative stage, two procedures may be employed:

A. Repeated Puncture.—With a needle sufficiently large to allow pus flakes to pass through, puncture is performed at the most dependent point with the strictest aseptic precautions. The proper procedure from the cosmetic and practical standpoints is puncture in an oblique direction from a point at some distance from the abscess, so as to avoid ulceration of the skin and ugly scar formation. The purulent fluid is evacuated and an occlusive aseptic dressing carefully applied over the site of puncture. Most observers recommend that the procedure be supplemented, after the evacuating puncture, by injection of a few cubic centimeters of a solution of iodoform in oil, glycerin or ether. Ten per cent. iodoform-ether to the amount of 0.5 to 1 cubic centimeter (8 to 16 minims) is one of the most frequently used solutions.

B. Filiform Drainage.—A bundle of strands (2 or 3) of silkworm gut is passed into the abscess with a suture needle, knotted to form a loop, and an aseptic dressing applied. Recovery generally follows in twelve or fifteen days without conspicuous scarring.

If one desires with either of the above procedures to obtain satisfactory results as regards scarring and in particular to avoid abnormal scars and sinus formation (sometimes unavoidable), it is advisable: (1) To adopt the most rigid aseptic precautions to prevent secondary infection. (2) Not to wait, before carrying out the procedure, until the abscess, having become adherent to the skin, already shows a tendency toward ulceration.

III. TREATMENT OF THE PRIMARY LYMPHADENOPATHIES.—Less than twenty years ago, this subject was one of the most deplorably weak in the practice of medicine. The usual prescription of life in the country, a strengthening diet, and some ordinary arsenical preparation ill concealed our almost complete powerlessness in the matter. Neither splenectomy, fortunately abandoned after a few disastrous cases had been reported, nor splenic organotherapy, harmless but ineffective—the product of a childish generalization of a principle yielding some really useful applications—added much luster to our capabilities in this connection.

Without having much cause to be very proud, we nevertheless are now possessed, in *X-ray therapy* and the *arsphenamin group*, of two powerfully active measures for the treatment of primary lymphatic enlargements with or without associated leukemia.

The **X-rays**, in particular, can be credited with having yielded extremely striking results. All varieties of primary lymph-gland enlargement have been more or less favorably influenced, with more or less lasting benefit, by the X-rays (*q.v.*).

In a series of communications before the Société de pédiatrie, which were followed by unanimous agreement on the question discussed (including the opinions of Nobécourt, Marfan, Guinon and d'Élsnitz), the fact was demonstrated that even tracheobronchial glandular enlargements are quite amenable to X-ray treatment, and striking cases in support of this contention were produced.

The **arsphenamins** given intravenously, have also given impressive results. The gland enlargements are sometimes favorably influenced by it, for a varying period of time. Cases of *lymphosarcoma* have even been reported which had been treated by combined excision and intravenous arsphenamin injections and showed no sign of recurrence for years (7 years in one instance).

I have not personally seen any instance of complete cure of a primary lymph-gland enlargement with marked leukemia, but long remissions, usually of several years, resulted in my cases, including a few of a very grave type, from the combined use of the X-rays and arsphenamins.

The rays seem to exert a selective destructive action on the polymorphonuclear cells, which are reduced more in their absolute number than in their relative proportion to the other leukocytes. Benzol causes a rapid drop in the number of myelocytes. Hence, the satisfactory effects of combined treatment with these agents.

HEADACHE (CEPHALALGIA).

[κεφαλή, *head*; ἄλγος,
pain. *Headache*.]

BY ANDRÉ LUTIER, M.D.

The treatment of "headache" is subordinate to an exact diagnosis. This treatment must, indeed, above all be one based on the cause, and the aspirin or antipyrin tablet, or one of the innumerable proprietaries used and abused, must be only a temporary measure to be replaced as soon as possible by a rational treatment deduced from a painstaking symptomatic analysis.

The following are the principal causes to be looked for:

INFECTIOUS DISEASES.—Headache may then be a symptom of the disease or a complication (meningeal, renal, etc.). A regular return of the attacks should suggest the possibility of malaria, of which the headache may represent a larval form: Quinine sulphate will then overcome it.

UREMIA. HIGH BLOOD-PRESSURE.—Venesection, diet restricted to water, then milk; purges.

GOUT.—Give colchicum preparations.

STERCOREMIA. CONSTIPATION.—Oily laxatives (liquid petrolatum, small doses of castor oil) to be used, and from time to time sodium sulphate in small repeated doses. Sedentary habits to be avoided.

LIVER DISORDER. BILIOUS HEADACHE.—Small doses of calomel or sodium sulphate. A course of Vichy water.

INTOXICATIONS (lead poisoning, tobacco poisoning, abuse of drugs, including theobromine, iodine, opium, sodium salicylate, etc.).

ANOXEMIA. ANEMIA.—Ventilation to be supervised; the possible causes of carbon monoxide poisoning to be looked for. Give iron or arsenic to anemic patients.

MIGRAINE (see treatment of *Migraine*).

FACIAL NEURALGIA.—The headache is paroxysmal.

NEUROSES. PSYCHONEUROSES (*neurasthenia, psychasthenia, hysteria, epilepsy, etc.*).—Hydrotherapy (tepid). Suggestion. Nerve tonics. Static electricity. Potassium bromide, etc.

MENINGITIS.—Lumbar puncture alleviates the headache.

BRAIN TUMOR.—Any paroxysmal headache should suggest brain tumor and lead to an examination for papillary stasis. Lumbar puncture may give relief to the patient, but may have untoward results.

SYPHILIS, SECONDARY or TERTIARY.—Specific treatment will alone act on the headache: Mercury, arsenic, bismuth. Do not forget potassium iodide, sometimes an indispensable adjuvant.

OCULAR AFFECTIONS.—Suitable glasses (myopia, presbyopia, etc.).

NASAL AFFECTIONS.—Treatment of a sinusitis, a chronic nasopharyngeal infection, removal of polypi, etc.

EAR AFFECTIONS. Treatment of otitis.

VISCERAL AFFECTIONS (reflex headaches):

Pleuropulmonary headache.

Digestive headaches: Dyspeptic persons, heavy eaters, especially of meat; rapid eaters. Recommend eating slowly, a diet principally vegetarian, and laxatives.

Utero-ovarian headache.—Headache of ovarian origin is either intermittent, occurring at the onset of menstruation, or continuous. Ovarian or pluriglandular opotherapy.

Thyroid headache.—These are myxedematous, hypothyroid patients. Thyroid treatment, beginning with 0.005 gram ($\frac{1}{42}$ grain) of thyroid and increasing up to 0.02 gram ($\frac{1}{3}$ grain) a day, in periods of five days, with two-day intervals. The remedy is to be stopped if insomnia, tremor, palpitations, or rapid pulse appears.

The headache of the growing period is allied to the headache of endocrin origin. Hydrotherapy, exercise, and outdoor life are indicated. Thyroid opotherapy, and, in addition, testicular substance in boys, and ovarian substance in girls.

EPICRANIAL CELLULITIS (sensitiveness of the epicranial aponeurosis to pressure; palpable nodosities infiltrating the tissues of the head and neck, notably the muscles).—Massage: All nodes in the muscles, fasciæ, and tendon insertions to be crushed down. Hot air douches. Electricity.

HEMATEMESIS.

[*αἷμα, blood; ἐμεῖν, to vomit.*
Vomiting of blood.]

BY LÉON MEUNIER, M.D.

In **hematemesis** the blood extravasation may result from a number of different causes, which can be grouped as follows:

1. **Exceptional Causes:** Infectious diseases, intoxication, substitution for hemorrhoid or menstrual bleeding, hysteria, reduced atmospheric pressure (ascension in a balloon or airplane), uremia, and strangulated hernia in an old person.

2. **Commoner Causes:**

Esophagus: Varicose condition.

Stomach: Cancer, ulcer, varicose condition.

Duodenum: Ulcer.

Liver: Cirrhosis, grave icterus, compression of the portal vein.

Circulatory system: Heart failure, aneurism.

The therapeutic measures required must necessarily vary according to the type of case, and an exact diagnosis must be available as the foundation for rational, causal treatment.

From the standpoint of practice, *hemorrhage originating in gastric ulcer makes up 90 per cent. of the cases of true hematemesis.*

A treatment for gastric hemorrhage will therefore be described as the **typical treatment** of hematemesis.

What Not to Do.—In the treatment of definite gastric hemorrhage there are certain time-honored procedures which are commonly used, but which to me appear to be dangerous for the patient.

Every one is agreed that in the first few days following the hemorrhage the stomach should be placed absolutely at rest and that, accordingly, nothing is to be done which might stimulate gastric secretion. With this object in view, in accord with the physiologic concepts of Pawlow, which should serve as a basis in the treatment of gastric disorders, here is *what should not be done*:

Chemical Secretion and Ice.—It is customary, at the onset of any gastric hemorrhage, to have the patient take iced water or even swallow small pieces of ice. *In my opinion this measure must be absolutely discarded.*

Indeed, the experiments of Pawlow show plainly that water, even when introduced directly into the stomach through a gastric fistula, is in the highest degree a chemical excitant of the gastric glands.

Secretion occurs at once into Pawlow's miniature surgical stomach, whereas food materials such as starches, fats, and even egg albumin induce no secretion.

When water is taken by the mouth, to the resulting chemical secretion there is added a gustatory secretion, and in the comparative experiments I have made with iced water introduced into the stomach by the mouth, I obtained amounts of secretion of the same order as with bouillon, the usual peptogenic food.

Gustatory Secretion and Mouth Washing.—In cases of gastric hemorrhage, classically described measures are to interdict all food but to rinse the mouth frequently with Vichy water or some flavored water.

This is another mistake.

The experiments of Pawlow on dogs esophagostomized and provided with a miniature surgical stomach show clearly the part taken by the sense of taste in gastric secretion. The mere entrance of food into the buccal and pharyngeal cavities evokes gastric secretion to such an extent that Pawlow was able to collect, as a result of this action, as much as 700 cubic centimeters of gastric juice, and to make the statement that the contact of a food with the oral mucous membrane is the *primum movens* which rouses to activity the neuroglandular mechanism of the stomach. Consequently, any rinsing of the mouth in the initial period of a hemorrhage induces a harmful gustatory secretion in the stomach.

Psychic Secretion.—Lastly, one must exclude from the patient's vicinity all factors that might stimulate his appetite, such as talk about cooking, the taking of food by others in his presence, the penetration of kitchen smells, etc.

Simultaneous or separate stimulation of the special sense organs, taste, sight, smell, and hearing, says Pawlow, constitutes the first and the most powerful stimulant of the activity of the gastric glands. The desire for food is at the bottom of the gastric secretion. Excitation of a fasting animal by the mere sight of food is sufficient to permit of collecting gastric juice through a gastric fistula.

Hence the necessity, in order to avoid all secretion, of excluding everything capable of awakening the appetite, since, according to the definition given by the Russian physiologist, "the appetite is gastric juice."

First and second days	No food of any kind.
Third day	250 grams of isotonic sugar solution (6 grams of sugar per 100 c.c. of water).
Fourth day	500 grams of sugar solution.
Fifth day	500 grams of sugar solution and 500 grams of milk.
Sixth day	500 grams of sugar solution and 1 liter of milk.
Seventh day	1½ liters of milk.

Beginning with the eighth day, the milk is continued, but soups, milk foods, creams, and purées gradually added. Stress is to be laid on fats, such as butter, cream, etc.

In the event of pain, but only in such event, the patient is given in a little water one or more pinches of some insoluble alkaline powder, such as calcium carbonate or the following combination:

R Calcii carbonatis præcipitati 50 grams (3xiiss);
Magnesii carbonatis 10 grams (3iiss).—M.

Resumption of Feeding.—As already stated, the patient must receive nothing by the mouth during the period of hemorrhage.

This is an excellent plan where but one hemorrhage occurs; but when the hemorrhage continues and recurs, the problem is more difficult.

The physician faces the following dilemma:

He will either have to continue starving the patient, thereby making it impossible for him to repair his local lesion; or, feed the patient, and in doing so induce gastric secretion and further hemorrhage.

To settle this question, one should rely mainly on Pawlow's experiments with dogs subjected to esophagostomy or the production of a separate gastric pouch.

Contact of a foreign body other than food with the gastric mucosa causes no secretion of gastric juice.

Any food may lead to the production of two secretions, *viz.*, a psychic secretion of gustatory origin and a chemical secretion of reflex origin.

The different classes of foods can be arranged as follows in the order of their action on gastric secretion:

Meats, peptones and bouillon: Maximal stimulation.

Starches: Limited action.

Fats: Inhibiting action.

Accordingly, proteins should be forbidden, fats ordered—particularly unskimmed milk or cream,—and finely divided and malted starchy foods allowed.

HEMATURIA.

[αἷμα — οὐρᾶν,
to urinate blood.]

BY DR. SAINT-CÈNE.

The treatment of **hematuria** is essentially that of its cause; to be effective, and especially to prevent recurrence, an exact diagnosis is a pre-requisite.

As a rule, hematuria sets in abruptly, without apparent cause, like an alarm signal. The proper procedure is to trace its origin and not waste time on fruitless hemostatic measures.

And first of all, is hematuria actually present?—Pseudo-hematuria (see *Hematuria* in "*Clinical Diagnosis*") and urethrorrhagia, generally the result of traumatism of the lower urinary passages, should be excluded.

True hematuria may be *partial* (initial or terminal) or *total*.

The **initial type of partial hematuria** is generally the result of some lesion of the prostatic urethra (gonorrheal urethrocystitis, varicose veins of the neck of the bladder in old persons, or vegetations of the verumontanum).

The treatment is that of the cause: Local sedatives, rest, and sometimes instillations; in old patients, in hematuria due to varicose veins of the neck of the bladder, it may be necessary to use the indwelling catheter.

The **terminal type of partial hematuria** is generally due to cystitis of the neck of the bladder. The cystitis is the condition to be treated.

Total hematuria is either vesical or renal in origin. Although a precise diagnosis of the seat of the bleeding can often be made clinically, the observer should be careful not to depend on a general clinical diagnosis alone and deprive himself of the advantages to be gained from the cystoscopic method of examination.

A simple cystoscopy, which presents no special difficulty and entails no risk for the patient, will either establish the vesical source of hematuria or exclude the bladder as the cause of the hemorrhage. If the latter is of intermediate degree and is not really a source of serious anxiety, the cystoscopy should be carried out only after the bleeding has stopped. In persistent, prolonged and serious bleeding, however, there should be no hesitation in resorting to it without delay.

In hematuria of intermediate severity supposedly of renal origin, there is sometimes advantage in carrying out cystoscopy during the actual hematuria. One can thus ascertain *de visu* from which kidney the blood is coming, and the information thereby obtained is of great value in subsequent diagnostic orientation. In some cases of vesical hemorrhage due to varicose veins, cystoscopic examination, which allows of actually seeing the bleeding point, is of prime importance.

Total vesical hematuria is generally due, in the order of frequency: 1. To one or more papillomas of the bladder. 2. To a cancerous tumor. 3. To a stone. 4. To certain forms of cystitis. 5. In rarer instances, to certain special conditions such as varicose veins, bilharziasis, purpura and hemophilia. 6. To traumatism. 7. Lastly, in the profuse prostatic hematuria that may be observed in cancer and even in simple hypertrophy of the prostate, or in some cases of severe hematuria that may take place above a stricture, the blood may flow back into the bladder and simulate vesical hemorrhage.

For each of these conditions a suitable form of treatment is available.

Papillomas of the bladder should be destroyed with the high frequency currents, applied endoscopically by the methods of Beer or Heitz-Boyer; when of large size, they require suprapubic cystotomy.

Cancer of the bladder may, at the beginning, be treated by a more or less extensive resection of the bladder, with application of radium.

The lesions attending bilharziasis should be cauterized by the endoscopic or suprapubic route.

In hemophilia, internal hemostatic medication is indicated.

In trauma of the bladder, an emergency operation is in order, as bladder wounds, when untreated, are particularly serious, whereas early operative intervention may save the patient.

Severe hemorrhages of prostatic or urethral causation may call for an emergency cystostomy.

Treatment of the hemorrhage per se comprises, in the first place, the use of a number of simple measures which may be sufficient in some cases.

Rest in bed, simple irrigations with very hot boiled water, irrigations with a hot solution of antipyrin, 4 per cent., and the use of internal hemostatics (calcium chloride and blood derivatives, such as coagulen, hemostyl, anthema, etc.) may suffice.

In some cases, however, hemorrhage from the bladder may be so profuse as seriously to threaten the life of the patient.

The presence of clots leads to retention and severe pain; the bladder empties itself only incompletely and remains distended, giving externally the impression of a mass, sometimes of large size.

In such a case, a large indwelling catheter (curved sound No. 18 to 22) should, in the first place, be inserted. Where the indwelling catheter proves inadequate, aspiration must be combined with it; this is often the best way to check a severe hemorrhage. In carrying out aspiration a large bladder syringe is used. About one-half of the contents of the syringe is injected into the bladder, and with the rest of the fluid remaining in the syringe barrel, the contents of the bladder is energetically sucked out. Sometimes it is advisable to make use of the metallic evacuating sound employed in litholapaxy and to carry out aspiration as in this operation with the Bigelow or Duchastelet aspirator.

There are more severe cases in which all these measures fail. The situation is serious and the patient's life in jeopardy; an emergency cystotomy may alone afford success in arresting the bleeding.

Among the different forms of bladder hemorrhage, there is one, **hemorrhage ex vacuo**, with which one should be thoroughly familiar. This is the type of hematuria which follows an unduly abrupt and complete evacuation of a distended bladder in a state of retention.

The way to avoid it is to empty a bladder the seat of retention or distention only slowly, and if necessary, to insert, before evacuation is complete, an indwelling catheter and occlude its outlet with a plug.

Renal Hematuria.—When cystoscopic examination of the bladder proves negative, the cause of a total hematuria resides in the kidney.

Here again, the means of examination and diagnosis at the disposal of the practitioner are insufficient. He must by all means, and without undue delay, call in the specialist, remembering that there are five major causes of renal hematuria which there is advantage in tracing out as soon as possible. These causes are, in the order of frequency:

1. Tuberculosis of the kidney.
2. Cancer of the kidney.
3. Nephrolithiasis.
4. Hematuric nephritis.
5. Trauma of the kidney.

There may also be some predisposing constitutional condition such as hemophilia, hemogenia, or latent hepatic insufficiency.

In certain cases hematuria is stated to be essential or cryptogenic, being symptomatic of some cause which is not actually perceptible but is sometimes revealed later (small latent tumors, varicose veins, angioma of the renal pelvis or papillæ, anomalous vessels, hydronephrosis, vascular dilatations, ureteral strictures, or larval renal tuberculosis).

The physician should be thoroughly cognizant of the possibility of making an early diagnosis at a time when he himself, by ordinary means, often cannot make such a diagnosis; he should also thoroughly realize that surgical intervention, if it is to take place, will be effective in proportion as it is instituted early.

In a certain number of cases it is possible through cystoscopy carried out during the actual hemorrhage to establish *de visu* which kidney is the source of the hemorrhage.

More commonly, however, it is at a time other than the period of hematuria that one is called upon to conduct an examination of the kidney to establish a definite diagnosis and supply a foundation for treatment adapted to the actual cause of the hematuria.

As for the symptomatic treatment of the hematuria *per se*, this consists mainly of rest in bed and the use of internal hemostatics.

Calcium chloride, in particular, acts favorably in hematuric nephritis.

In occasional instances, renal hemorrhage is sufficiently severe and threatening to require an emergency operation (nephrotomy or nephrectomy).

For combating the constitutional disturbances which may be caused by a too profuse hematuria (weakness, collapse, grave anemia), recourse should be had to injections of saline solution, to caffeine, and, if need be, to blood transfusion.

HEMIPLEGIA.

[*ἥμις, half; πλήγειν, to strike; more or less complete loss of motion in one side of the body.*]

The treatment of **hemiplegia** divides itself, from the standpoint of practice, into four stages requiring very different management, *vis.*:

The period of coma (if any).

The period immediately following the stroke, i.e., that comprising the first few days or the first week (period of bed-rest).

The period of recent hemiplegia, beginning at the close of the first week (period of reeducation).

The period of established hemiplegia (period of disability).

PERIOD OF COMA.—The indications and directions relating to this stage have been presented in the section on *Coma (q.v.)*.

PERIOD IMMEDIATELY FOLLOWING THE STROKE
(*period of bed-rest*).—

1. The **cause** should be **treated** without delay, if this be feasible:

(a) *Antisyphilitic* treatment, preferably with mercury; injections of soluble mercurial salts in ascending doses in the presence of cerebral arteritis.

(b) *Antirheumatic* treatment (sodium salicylate) or *anti-infectious* treatment in the presence of endocarditis.

(c) *Surgical* treatment, for cranial trauma.

(d) *Psychotherapeutic* treatment: Suggestion in the waking state or even under hypnosis in hysterical hemiplegia.

And so on.

2. The **symptoms** should be **treated**:

(a) *Mild purges* are nearly always indicated to antagonize the congestive factor.

(b) *Evacuation of the bladder*, often sluggish in this period, should be seen to.

(c) The plethora and high blood-pressure should be combatted by restriction to water, followed by a fruit and then a *milk* diet, and by repeated application of *wet cups* over the kidneys and liver.

(d) Much less commonly, weakness, faintness and low blood-pressure will require treatment with *camphor in oil* and the *diffusible stimulants*.

(e) *Enemas of chloral hydrate* and an *ice-bag to the head* in the event of cerebral irritation, and especially, of epileptiform seizures.

(f) The *lesser hygienic measures* required in hemiplegics confined to bed are discussed in the section on *Coma* (q.v.).

3. The paralysis should be treated as soon as possible.

On the second or third day a beginning should be made with *passive movements* intended to limber up the paralyzed limbs; these movements should be carried out methodically, one joint after another.

Gentle massage, consisting of effleurage (stroking) and pétrissage (kneading) of the muscles, should be practised.

This is of marked importance, and upon these initial measures frequently depends the whole future of hemiplegic patients as regards motor function. Yet, in this stage it is well to be very cautious and to require of the patient in the course of these procedures little more than that he shall be completely passive, as any exertion may induce a serious relapse.

PERIOD OF RECENT HEMIPLEGIA (*period of motor reeducation*).—The *causal and symptomatic treatment* involves precisely the same indications as in the preceding period.

The main difference concerns the *treatment of the paralysis* itself. This period is specifically that of motor training.

The procedures concerned relate to *myotherapy*:

1. *In dorsal recumbency*:

(a) Massage, effleurage, pétrissage, percussion, etc.

(b) Passive flexor and extensor movements at the joints.

(c) Active movements *assisted* mechanically and by psychic means.

(d) Later, movements against manual or elastic (rubber cords) resistance.

2. *In the sitting position*.

3. *In the standing position*:

(a) Rising and squatting exercises.

(b) Walking, with the assistance of two persons, then with one person on the affected side and a crutch on the other, then with two crutches, then with a cane and one crutch, then with two canes, then with one cane.

(c) Walking exercises along a straight line, with the feet stepping in rectangular areas marked on the floor, etc.

(d) Progressive stair climbing, etc.

4. *Upper extremities*:

(a) Traction, flexion and other exercises.

(b) Piano playing and, especially, writing; the patient's entire training in writing is to be repeated.

In the course of this myotherapeutic treatment, the useful conception of *motor abulia* and *functional motor amnesia* sponsored by Meyer and Brissaud should not be forgotten. The functional disability is partly psychic in origin. Systematic muscular exercise should be coupled with appropriate suggestion and explanations, which lead the patient to intensify and correct his motor acts.

One cannot but be impressed with the ingenuity, persistence and energy which has to be displayed with these unfortunate, generally abulic patients to force them up to these disciplinary procedures, really exhausting to them in the earlier stages. It took me over six weeks to train one of my hemiplegics to hold a pencil; over two months before he could draw single strokes, and three months before he could write coarse letters. At the end of a year's time, however, he could write short epistles and make fairly perfect drawings. After eighteen months, in spite of marked residual deficiencies, he resumed charge of his architectural office and was able to direct, with his mind and pen, some important undertakings. When circumstances permit of thus putting the patient through a course of training or some intelligent person among his associates is available to do it, surprising results are obtained.

Myotherapy can be greatly facilitated by immersion of the extremities in a lukewarm bath (tub bath for the lower extremities and partial bath for the arms). In accordance with the law of Archimedes, the extremities lose weight in the water in proportion to the volume of water they displace; the influence of gravity being thus largely annulled, the muscular exertions required are greatly lessened and the training can be prolonged with advantage.

Electrotherapy may be employed in this period, but only with considerable caution, preferably in the form of weak galvanic currents and only where some time has already elapsed since the stroke. If used in an excessive or ill-considered manner, electric treatment favors and increases the much dreaded contracture in the affected parts. Yet, in cases already of six weeks' standing and showing no marked tendency to contracture, brief, moderate faradism, or better, intermittent galvanism, is capable of yielding appreciable service. (See *Electrotherapy*.)

This aspect of the treatment of hemiplegia is of capital importance. The future of hemiplegic cases may be said to depend on it almost wholly. Too much stress cannot be laid on the frequently "surprising" results that may be expected of it; these cannot be obtained, however, unless the physician himself is confident, methodical and persistent and inspires the patient likewise with these attributes.

PERIOD OF ESTABLISHED HEMIPLEGIA (*period of disability*).—This is hardly to be differentiated from the preceding period as regards the therapeutic indications; it is distinguished from it mainly in the results that can be obtained by treatment, which are very limited and uncertain. The patient is no longer an ill person, but a disabled one. He cannot, however, be left hopelessly to his own devices.

If he is still generally sound:

An attempt should be made, in spite of all, to carry out the above-described course of psychomotor reeducation.

His symptoms, such as constipation, high blood-pressure, azotemia, etc., should receive treatment.

The underlying disease should also be dealt with.

If he is demented or incontinent, the treatment will relate largely to hygiene and comprise mainly the minor measures and supervision (see *Coma*) through which the attempt may be made to prevent decubital ulcers, infections and other complications.

HEMOPTYSIS.

[αἷμα, *blood*; πύσις, *spitting*. *Spitting*
of blood. (See also *Expectoration*.)]

In actual practice, **hemoptysis** of tuberculous origin alone requires an active and special form of therapeutic intervention. Hemoptysis the result of pulmonary infarction (mitral stenosis, cardiac and arterial disease, heart failure or phlebitis) is never sufficiently profuse to require treatment other than that of the cause and the conventional psychotherapeutic management calculated to insure quiet for the patient and allay the fears of his associates. A few words, however, will be said at the end of this section regarding the treatment of gouty hemoptysis and the hemoptysis of aneurism.

I.—HEMOPTYSIS IN TUBERCULOSIS.

The treatment of hemoptysis is certainly one of the most knotty problems in the management of tuberculous cases; a problem among those which have most taxed the ingenuity of the therapist, and one of those of which it may be said that in spite of, or perhaps even on account of, the number of accumulated contributions (which are contradictory), the greatest confusion still prevails. Some observers advertise their high degree of skepticism in the matter: The fact is that we have not yet emerged from a rather crude empiricism in this connection. There have been recommended—in fact, there are still being recommended,—whether on the basis of theoretic conceptions or of clinical observations, such measures as the giving of acid drinks (sulphuric acid in alcohol, 1:4) and calcium chloride, vasoconstrictors (ergot, adrenalin) and hypotensor vasodilators (ipecac, emetine, amyl nitrite, nitroglycerin).

The reasons for these apparent (and even actual) contradictions are probably as follows:

1. **Most cases of hemoptysis tend naturally toward spontaneous cessation.** General measures such as rest, abstention from talking, moderation in coughing, and a return to physical and mental quietude prove to be sufficient treatment. These cases terminate *in spite* of any measures used. but each method, acid or alkaline, raising or lowering the

blood-pressure, is incorrectly credited with having checked the bleeding.

2. **The cases of hemoptysis are not all alike.** Some, constituting instances of *hemoptysis due to active congestion*, may be and frequently are accompanied by vascular irritability and high blood-pressure, and the blood-pressure-lowering vasodilators may exert a favorable influence. The others, instances of *hemoptysis due to passive congestion* or vasomotor paresis, may be accompanied by vascular atony and low blood-pressure, and the vasoconstrictor agents may exert a favorable influence. In other cases still, one of these two hemorrhagic mechanisms may follow the other, or they may even be combined.

3. Lastly, in hemorrhage the result of ulceration of vessels, **treatment, of whatever nature, is often powerless if the vessels involved are too large.** The proposal has, however, been made to institute artificial pneumothorax in these cases, retraction of the lung being thus effected, with consequent direct compression of the bleeding vessel. This is sometimes a procedure of last resort.

Thus it will be seen that the question is one of varying clinical conditions and that while there are some cases (hemoptysis due to active hyperemia about early lesions, and hemoptysis due to ulceration of vessels in the stage of cavity formation) in which the pathogenesis is sufficiently clear to permit of precise therapeutic applications, the greater number, including nearly all the cases in the stage of softening, relate to "therapeutic instinct" rather than to "therapeutic science."

1. In the slight **congestive hemoptysis of beginning tuberculosis**, rest, starvation, absolute quiet and some form of mustard counter-irritation generally prove sufficient treatment.

2. In the **profuse congestive hemoptysis attended with fever**, pronounced vascular crethism, high blood-pressure and very widespread hyperemia, the *vasodilators* frequently do wonders, in conjunction, of course, with general measures (rest, mustard applications to the lower extremities, starvation, etc.). One may prescribe:

(a) **OPIMUM**, somewhat overlooked, it seems, by the neotherapentists, cannot be praised too highly. It allays the cough, quiets the patient, relaxes the nervous system—and frequently procures a very serviceable sense of well-being. The simplest form of administration is the pill of extract of opium, 0.01 gram ($\frac{1}{6}$ grain). Five or 10 such pills may be given in twenty-four hours—the first 5 at intervals of ten minutes and the remainder one or two hours apart. If necessary, there should be no hesitation in giving an injection of 0.01 to 0.02 gram ($\frac{1}{6}$ to $\frac{1}{3}$ grain) of morphine.

(b) **IPECACUANHA** in nauseant doses. It acts remarkably well in certain cases:

℞ Ipecacuanhæ 2 grams (3ss);
 Aquæ 90 c.c. (f3iij);
 Fac infusum et adde:
 Syrupi opii (0.4 per cent.) q. s. ad 120 c.c. (f3iv).
 Sig.: One teaspoonful every half-hour until nausea comes on.

Sabourin prescribes ipecac in massive emetic doses (2 to 3 grams—30 to 45 grains—taken at intervals of a few minutes in lukewarm water). "The method is a somewhat trying one," as the author himself admits, but in his experience gave unexpectedly good results in some grave cases. This was a measure already recommended by Trousseau.

In recent years, substitution of **EMETINE**, an alkaloid obtained from ipecac, for the latter drug has been advocated. Sabourin is skeptical as to its actual efficacy. He writes: "I have never seen emetine injections unmistakably arrest the recurrences of a hemoptysis which was beginning to be troublesome."

That emetine has a manifest influence in lowering blood-pressure is hardly to be doubted, it seems; on this basis, it might exert a rather rapidly favorable effect in the hyperemic hemoptysis of cases of tuberculosis with high blood-pressure—an exceptional variety, on the whole, as tuberculosis is *par excellence* a blood-pressure-lowering disorder.

On occasion, one would order ampules of emetine hydrochloride each containing 0.04 gram ($\frac{2}{3}$ grain) in a cubic centimeter of solution. The contents of one, two or at most three such ampules may be injected hypodermically in twenty-four hours.

(c) **AMYL NITRITE** by inhalation may be used, one or more pearls being crushed in a handkerchief. A 5 or 6 *drop* dose is generally sufficient. The termination of the hemoptysis is often prompt and is accompanied by congestion of the face, tinnitus and dizziness.

This is a valuable measure and every practitioner called to see a case of hemoptysis should take some amyl nitrite with him.

(d) **NITROGLYCERIN** by the mouth or by injection may be used for the same purpose:

℞ Spiritus glycerylis nitratis gtt. xxx;
 Aquæ destillatæ 300 c.c. (f3x).
 M. Sig.: Three to five tablespoonfuls in twenty-four hours.

3. In hemoptysis brought on either by passive venous congestion or by vascular ulceration and associated with evidences of low blood-pressure, it is rational, on the other hand, to try the use of vasoconstrictors, such as *ergot* and *adrenalin*, and of heart-tonics, such as *digitalis*.

(a) **ERGOTIN** may be given either in pills, liquid preparations or by hypodermic injection.

Pills:

℞ Quininae dihydrochloridi,
Ergotæāā 0.05 gram (gr. $\frac{9}{4}$);
Extracti opii 0.01 gram (gr. $\frac{1}{40}$).
Ft. pil. No. i. Da tal. No. xx.
Sig.: Five to eight pills in twenty-four hours.

Liquid preparation:

℞ Extracti ergotæ aquosi (N. F.) 1 gram (gr. xv);
Syrupi aurantii amari 40 c.c. (f3x);
Aquæ destillatæ 50 c.c. (f3xiiij).
M. Sig.: One dessertspoonful every two hours.

Hypodermic injection:

℞ Extracti ergotæ aquosi (N. F.) 2 grams (3ss);
Aquæ destillatæ 10 c.c. (f3iiss);
Glycerini 8 c.c. (f3ij).
M. Sig.: One to 5 c.c. (15 to 75 minims) to be injected hypodermically.

[Special aseptic preparations of ergot for hypodermic use had better be substituted for the preceding formula, to reduce the likelihood of local irritation.—Tr.]

(b) **ADRENALIN** is used in the form of adrenalin chloride in doses of 0.00025 to 0.001 gram ($\frac{1}{260}$ to $\frac{1}{65}$ grain). The 1:1000 solution is generally employed. The standard dropper delivers 20 drops of this solution to the cubic centimeter.

Five to ten drops (0.25 to 0.5 c.c.—4 to 8 minims) of the 1:1000 solution is a suitable initial dose. Twenty drops is a suitable daily dose in a new case.

The drug is like a two-edged sword; clinical accounts concerning its use in these cases are contradictory. According to Sergeant its employment is attended with risk.

(c) **CAMPHOR IN OIL** is warmly advocated by some clinical observers. In doses of 3 to 5 cubic centimeters (48 to 80 minims), the 20 per cent. solution of camphor in oil is claimed sometimes to produce a very distinct hemostatic effect. The suggestion to use it should be kept in mind.

(d) **DIGITALIS** can very well be combined with the foregoing drugs, as in the following formula:

℞ Digitalis pulveris,
Quininae dihydrochloridi,
Ergotæ,
Pulveris ipecacuanhæ et opiiāā 0.03 gram (gr. ss).
Ft. pil. No. i. Da tal. No. xx.
Sig.: Five to eight pills in twenty-four hours.

(e) **IPECAC WITH DIGITALIS.**—The recent experiments of Bonnamour and Montaye with ipecac and of Plumier-Clermont with digitalis have demonstrated a pronounced vasoconstrictor action on the part of these two drugs on the pulmonary capillaries. Again, the action of ipecac and of digitalis on inflammatory processes of the lungs (pneumonia, bronchopneumonia, etc.) is already well known. Hence the idea of combining these two drugs in combating hemoptysis, which is generally the result of an acute attack of hemorrhagic pneumonia.

Ampules of ipecac-digitalis (Dausse) are used, each containing 1 c.c. and corresponding to 0.2 gram of standard powdered ipecac and to 0.025 gram ($\frac{1}{40}$ grain) of extract of digitalis. This is given in daily intravenous injections. In refractory cases 2 c.c. should be injected. This treatment, which often gives remarkable results, can be kept up for some ten days without difficulty (Piéry and Michel).

Many other measures may be advised in **refractory cases**:

CALCIUM CHLORIDE seems actually to exert a hemostatic effect, but only a relatively slow, gradual action can be expected of it.

One might prescribe:

R	Calcii chloridi	30 grams ($\frac{3}{4}$);
	Syrupi aurantii amari	225 c.c. ($\frac{1}{2}$ viiss).

M. Sig.: One dessertspoonful every two hours until the hemorrhage stops.

Intravenous injections of calcium chloride (5 c.c.—80 minims—of a 50 per cent. solution) may bring on symptoms of shock.

HYPODERMIC INJECTIONS OF GELATIN SOLUTIONS are of real value in obstinate hemoptysis. Their hemostatic action is generally accepted by phthisiologists. The measure is one particularly suitable for serious emergencies.

The preparation to be ordered is a 3 per cent. solution of gelatin in physiologic salt solution, *carefully sterilized* at 115° C. The dose is 10 to 500 cubic centimeters ($2\frac{1}{2}$ fluidrams to 16 fluidounces), according to the case.

If such a preparation is not obtainable the coagulant effect of hypodermic injections of *animal serums* may be resorted to with advantage. In the absence of fresh serum, *diphtheria antitoxin* or *hematopoietic serum* (serum of bled horses) should be injected in doses of 40 cubic centimeters (10 fluidrams) every two or three days until the hemorrhage stops, or better, the seric serum of Dufour and Le Hello (Anthem, Poulenc) may be given in doses of one or more ampules a day, if necessary repeated for a few days.

Autohemotherapy, counselled by Ramond, might also be employed: Twenty cubic centimeters of the patient's own blood are collected by

vein puncture in a 20-c.c. syringe coated with paraffin within, and at once reinjected subcutaneously through the same needle. This procedure, according to Ramond, is always well borne, and besides checking the hemorrhage, is asserted in a measure to allay the fever and rapid heart-action.

Some observations by Wiggers and Rist point to a favorable effect on the part of the extract of the posterior lobe of the pituitary. Pituitrin [or *Liquor pituitarii*, U. S. P.] has been given mainly by intravenous injection. In a dosage of 0.5 cubic centimeter (8 minims) it is stated to have yielded rapid and permanent arrest of the hemorrhage. It may, however, induce symptoms of shock, sometimes mild, sometimes very severe (vasomotor disturbances, scarlet flushing of the face followed by pallor, mental confusion, unconsciousness, cyanosis).

Certain precautions must therefore be taken: One-half cubic centimeter (8 minims) of extract of the posterior lobe of the pituitary should be mixed with 10 c.c. (160 minims) of physiologic salt solution. This mixture is to be introduced into a vein at the bend of the elbow, *sufficiently slowly* that the injection shall *take at least five minutes*.

ARTIFICIAL PNEUMOTHORAX is the most powerful weapon available with which to combat very grave and overwhelming hemoptysis, provided that the hemorrhage be unilateral and that the side of the hemorrhage can be definitely ascertained, while the other lung is normal or nearly so: It acts very much after the manner of a ligature, and if applied promptly may save lives otherwise threatened with an early termination.

OXYGEN INHALATIONS cannot but prove beneficial, but that they influence the hemoptysis itself is doubtful.

HEPATIC ORGANO-THERAPY has been recommended in draggy cases of hemoptysis by Gilbert. Four to eight pills, each containing 0.25 gram (4 grains) of liver extract, are prescribed *per diem*.

CONSTRICTION AT THE ROOTS OF THE EXTREMITIES, already applied by Herophilus and Galen, is imperative as an emergency measure in all serious cases of hemoptysis, for obvious reasons.

Injection of saline solution is indicated after very profuse hemoptysis that has caused marked lowering of blood-pressure and anemia.

* * *

The giving of ice internally is a time-honored and commonly used procedure. Is the measure rational and effectual? This seems very doubtful. Sabourin says: "I believe ice more useful in the form of an ice-bag to be applied over the part of the chest from which the

hemorrhage is supposed to be coming." Such external applications of ice—with the usual precautions, *viz.*, a double layer of flannel between the ice-bag and the skin—constitute one of the best measures at our disposal.

Application of ice over remote areas, e.g., over the region of the genitals, has also been advised. Possibly in a few fortunate cases arrest of hemorrhage may have resulted from a reflex vasomotor spasm induced by this procedure.

* * *

For some days after the cessation of the hemorrhage the following instructions should be adhered to:

- (a) Rest in the room.
- (b) Absolute interdiction of tea, coffee, tobacco, alcoholic fluids and other stimulants.
- (c) A restricted mixed diet, mainly liquid: Milk and its products, and eggs.
- (d) All exertion to be avoided. This includes prolonged conversation, coughing, crying out, constipation and coitus. The ordinary mode of life should be resumed only with caution.

* * *

If now we try to condense the foregoing considerations into the form of concrete instructions for cases of the types commonly seen, the following directions may be formulated:

Copious Hemoptysis in a Consumptive.

I. General Directions as to Hygiene and Diet:

Complete rest in bed or on a couch or arm-chair.

No talking; coughing to be restricted as much as possible.

Smokers, incessant talkers and restless individuals to be excluded.

An exclusively liquid diet, divided into small amounts:

Acid beverages, cool or iced.

Milk products.

Fruit juices.

Mild counterirritation to the chest.

Mustard applications; cupping.

II. Pharmaceutic Prescriptions:

IN THE PRESENCE OF FATIGUING COUGH, a hypodermic injection of 0.01 gram ($\frac{1}{10}$ grain) of morphine or a tablespoonful of the following preparation at half-hour intervals:

R <i>Calcii chloridi</i>	5	grams (gr. lxxv)
<i>Aquæ laurocerasi</i>	5	c.c. (℥lxxx);
<i>Æthylmorphinæ hydrochloridi</i>	0.05	gram (gr. $\frac{3}{4}$);
<i>Syrupi tolu</i>	45	c.c. (f℥iss);
<i>Syrupi aurantii florum</i>	30	c.c. (f℥j);
<i>Aquæ destillatæ</i>	60	c.c. (f℥ij).

M. Sig.: This amount not to be exceeded in twenty-four hours.

IN THE PRESENCE OF CARDIAC IRRITABILITY AND MANIFEST HIGH BLOOD-PRESSURE, the patient should be given the contents of a pearl of *amyl nitrite* to inhale and, a hypodermic injection of:

R <i>Emetinæ hydrochloridi</i>	0.04	gram (gr. $\frac{2}{5}$);
<i>Aquæ destillatæ sterilisatæ</i>	1	c.c. (℥lxxvj).

Pone in ampullam No. i.

Three such ampules may, if necessary, be used in one day.

IN THE EVENT OF CONTINUOUS HEMORRHIAGE, WITH THE BLOOD WATERY AND SHOWING LITTLE TENDENCY TO CLOT:

(a) Hypodermic injection of 20 cubic centimeters (5 fluidrams) of serum from bled horses or of antitetanic or antidiphtheritic serum.

(b) Enema or injection of 100 to 250 cubic centimeters (3 to 8 ounces) of 3 per cent. gelatin in saline solution.

IN THE EVENT OF SEVERE HEMORRHIAGE WITH A TENDENCY TO COLLAPSE: .

(a) Injections of large quantities—200 to 500 cubic centimeters (6 to 16 ounces)—of 3 per cent. gelatin in saline solution.

(b) Injections of camphor in oil.

(c) Tying off the extremities.

(d) Application of ice over the scrotum and warmth to the rest of the body.

(e) Diffusible stimulants.

[See also Part IV: *Pulmonary Tuberculosis*.]

II.—HEMOPTYSIS IN GOUT.

This condition is distinctly of the nature of an **active hyperemia** and should, in a measure, be allowed to go unchecked. It is sometimes alarming.

The more usual therapeutic indications are:

1. *Local blood-letting* (wet cupping over the affected pulmonary lobe and especially over the bases) or general blood-letting (venesection, 150 to 300 c.c.—5 to 10 ounces).

2. *Counterirritation*, particularly in the form of *mustard packs* and *mustard foot-baths*.

3. *Emergency hypotensor medication* may be of service in two of its forms:

- (a) Amyl nitrite inhalations.
- (b) Hypodermic injections of emetine.

4. *Starvation or fruit diet.*

III.—HEMOPTYSIS IN ANEURISM.

This form is generally overwhelming and beyond medical aid. In the event of survival, at least temporarily:

- 1. Copious injections of 3 per cent. gelatin in saline solution.
- 2. Tying off the extremities.
- 3. If required, the diffusible stimulants.

HEMORRHAGE, [αἷμα, blood; ραγή, rupture. Outpour- NON-SURGICAL. ing of blood from the vessels.]

Non-traumatic hemorrhagic conditions require, independently of their cause, a *routine emergency hemostatic treatment* which lends itself well to a general review such as the following (based partly on a report of Carnot to the 13th French Congress of Medicine):

Local hemostasis is feasible only where the hemorrhage, whether it be arterial or venous, is circumscribed and is located in an accessible region. This applies, *e.g.*, to epistaxis, hemorrhage from dental sockets and gums, some cases of hemorrhage in the digestive tract (hematemesis, hemorrhoids), and uterine hemorrhages. The indications for local treatment in some of these conditions are mentioned in the corresponding sections of this work. Among the measures used are pressure, arterial compression by hemostats, tamponing and packing.

In most instances, **general hemostasis** must be resorted to. For this purpose a wide variety of agents may be employed:

A. Physical Agents.—Heat, and more particularly, cold.

Heat produces its effect through precipitation of proteins and a reflex vaso-constrictor action, occlusion of the bleeding vessel resulting. The measures applied, according to the case under treatment, comprise: Hot irrigations (50° C.—122° F.), large rectal enemas, the thermocautery at a dark red heat, the galvanocautery, electro-coagulation, etc.

Cold acts mainly through reflex vaso-constriction, as in the case of an ice-bag over the epigastrium, chest or testicles.

B. Pharmaceutic Agents.—External:

Acid solutions (sulphuric acid, 1:4, etc.).

Ferric chloride: 10 per cent. solution (for local applications); 0.1 per cent. solution (for hematemesis—Bourget); gelatin with addition of ferric chloride.

Antipyrin: In a powder or saturated solution, for local application.

Hydrogen peroxide: On tampons.

Vaso-Constrictors: *Ergot, adrenalin*.—The obvious vaso-constrictor effect of these agents may promote occlusion of the affected vessel, but they have three drawbacks:

Their action is evanescent (a few minutes at most).

They entail risk of a serious local secondary hemorrhage.

They raise the blood-pressure and may in this manner promote further hemorrhage.

Vaso-Dilators: *Amyl nitrite* and *ethyl iodide* may produce results in a manner directly opposite to that relating to the preceding drugs, *viz.*, by temporarily lowering the blood-pressure.

Emetine and *ipecac*, through their nauseant action, appear to act at least partly by reduction of blood-pressure.

Coagulants: These favor clotting of the blood and the formation of the clot required to close off the bleeding vessel.

1. **SALINE SOLUTIONS:** Complex in action (coagulant, hemoplasmo-poietic, stimulant to leucocytosis, reconstituent, raising blood-pressure after extensive hemorrhage, etc.).

One of the many different saline solutions (*q.v.*) may be resorted to in this connection.

2. **CALCIUM CHLORIDE:** This promotes clotting in average amounts of 2 to 4 grams ($\frac{1}{2}$ to 1 dram), divided into 4 to 8 doses, which may be administered in syrup of bitter orange peel to mask the unpleasant taste of the salt. Although its action is somewhat inconstant, its indications are many: Hemoptysis, hematemesis, hemophilia, hemorrhagic states following infections or the result of insufficiency of the liver and kidneys, purpura, etc.

3. **GELATIN:** This agent increases the viscosity of the blood and acts as a coagulant which is decidedly active both for local application or general administration. The precaution should be taken of having it very carefully sterilized in the autoclave at 120° C. for twenty minutes in order to eliminate all risk of tetanus.

Locally: Application or tamponing with 5 or 10 per cent. gelatin in physiologic salt solution.

Oral administration of 5 per cent. gelatin in salt solution, of flavored jellies, or of articles rich in gelatin (meat jellies, calves' feet, lambs' feet, calves' head, etc.).

Hypodermic injections: 20 to 100 cubic centimeters ($\frac{2}{3}$ to $3\frac{1}{3}$ fluid-ounces) of completely sterilized 2 to 5 per cent. gelatin in saline solution.

Intravenous injection in emergencies.

The indications for gelatin are very numerous, *e.g.*, gastric ulcer, hematemesis, hemoptysis and hematuria. It yields little benefit in hemophilia. It appears to be contraindicated in cases of hemorrhage dependent upon local or general infectious processes.

4. **EMETINE** shortens the coagulation time.

Blood Preparations.—(a) **NORMAL ANIMAL SERUM.**—Horse serum (antidiphtheritic or antitetanic serum) may be used:

Either for local application over a bleeding area (epistaxis).

Or by ingestion in divided amounts.

Or by injection.

Injections entail a risk of serum disease or anaphylactic manifestations, and should therefore be reserved for cases of serious hemorrhage, avoided where the patient has previously received injections of serum, and never administered by the intravenous route.

(b) **NORMAL HUMAN SERUM.**—Administered by transfusion—formerly a considerable operation, now hardly a minor surgical procedure, thanks to the use of sodium citrate (see *Therapeutic Procedures*). This measure came into widespread use during the World War in the treatment of severe hemorrhage and shock (see *Low Blood-Pressure*).

(c) **SERUMS WITH ENHANCED COAGULANT PROPERTIES.**

(1) The serums used are those of animals whose blood is particularly rich in substances which activate coagulation (sheep and rabbit) or of animals in which hematopoietic activation has been induced by repeated bleeding (Carnot). Such blood is the seat of physiologic processes which favor coagulation. For practical purposes, horse serum rendered more active by repeated bleeding is the material used:

Either for local application, as in epistaxis, hemorrhage in the mouth, etc.

Or by ingestion—10 to 40 cubic centimeters ($2\frac{1}{2}$ to 10 fluidrams).

Or by subcutaneous or intramuscular injection.

It should be remembered that the injections may give rise to serum disease or anaphylactic disturbances.

(2) Dufour and Le Hello have recommended, along the same lines, what they term *antihemorrhagic seric serum*, obtained by accustoming rabbits to anaphylaxis so that they never succumb to anaphylactic disturbances; the serum thus obtained possesses very pronounced coagulant properties (*Presse méd.*, Oct. 1, 1919).

Organic Extracts.—Given by the mouth, organic preparations yield good results in hemorrhagic disorders associated with functional insufficiency of the corresponding organ, *viz.*,

(a) *Hepatic Disease.*—Grave icterus, the cirrhoses, fatty hepatitis and familial cholemia give rise to such hemorrhagic disorders.

(b) *Renal Disease.*—Nasal, retinal, urinary and meningeal hemorrhages and purpura may be met with in chronic nephritis. A hemorrhagic disturbance dominating the clinical picture and brought out by ~~traumatism~~ sometimes develops in uremic patients.

Hemorrhage of nephritic origin cannot be ascribed solely to the high blood-pressure and the vascular changes frequently present in Bright's disease. Chemical changes in the blood plasma, its greater fluidity and lowered viscosity, probably constitute a factor in the disturbance.

(c) *Changes in Other Organs.*—This includes changes in the adrenals, thyroid and the hemolymph structures—spleen, bone-marrow and lymph-nodes.

HICCOUGH.

A number of therapeutic procedures are available for the treatment of **hiccough** *per se*:

(a) **Minor Empiric Measures.**—All of these tend, in the last analysis, to exert an *inhibiting effect on the phrenic nerve*.

1. The patient is required to hold his breath as long as possible, meanwhile counting and trying to reach the highest possible figure without taking in any air, or attempting to recite some long piece all at one breath.

2. Very hot or cold applications to the epigastrium (ice-bag, ether spray), or counterirritation with mustard over the same area.

3. The patient breathes quickly and deeply in and out, 45 to 50 times a minute.

4. Swallowing small mouthfuls of very cold water (or ice) or very hot water (hot tea), or carbonated water (Seltzer water) and breathing in slowly and deeply after each swallow.

5. Continuous, prolonged and rather strong traction of the tongue out of the mouth with the finger or forceps.

6. Strong digital pressure over the phrenic nerve posterior to the right and left sterno-clavicular joints.

7. Galvanism of the phrenic nerve, with the positive pole at the neck and the negative pole over the insertions of the diaphragm, is the most radical of this series of minor measures, which are sometimes effectual.

8. Compression of the eyeballs (Loeper).

(b) **Pharmaceutic Measures.**—All of these have as their object either to anesthetize the mucous membrane of the stomach—as the commonest starting-point of the irritation, or *primum movens* of the hiccough reflex—or to produce an effect on the nerve centers themselves and interrupt the reflex arc at the center concerned.

The usual list of agents that depress reflex action is, therefore, availed of in this connection.

1. Chloroform water, cocaine, menthol (local analgesics).

2. Opium or morphine, belladonna or atropine, cannabis (local analgesics and central depressants).

3. Chloral hydrate, bromides, valerian (central depressants).
[Intramuscular injections of ether, 25 or 30 minims (1.6 to 2 c.c.).]

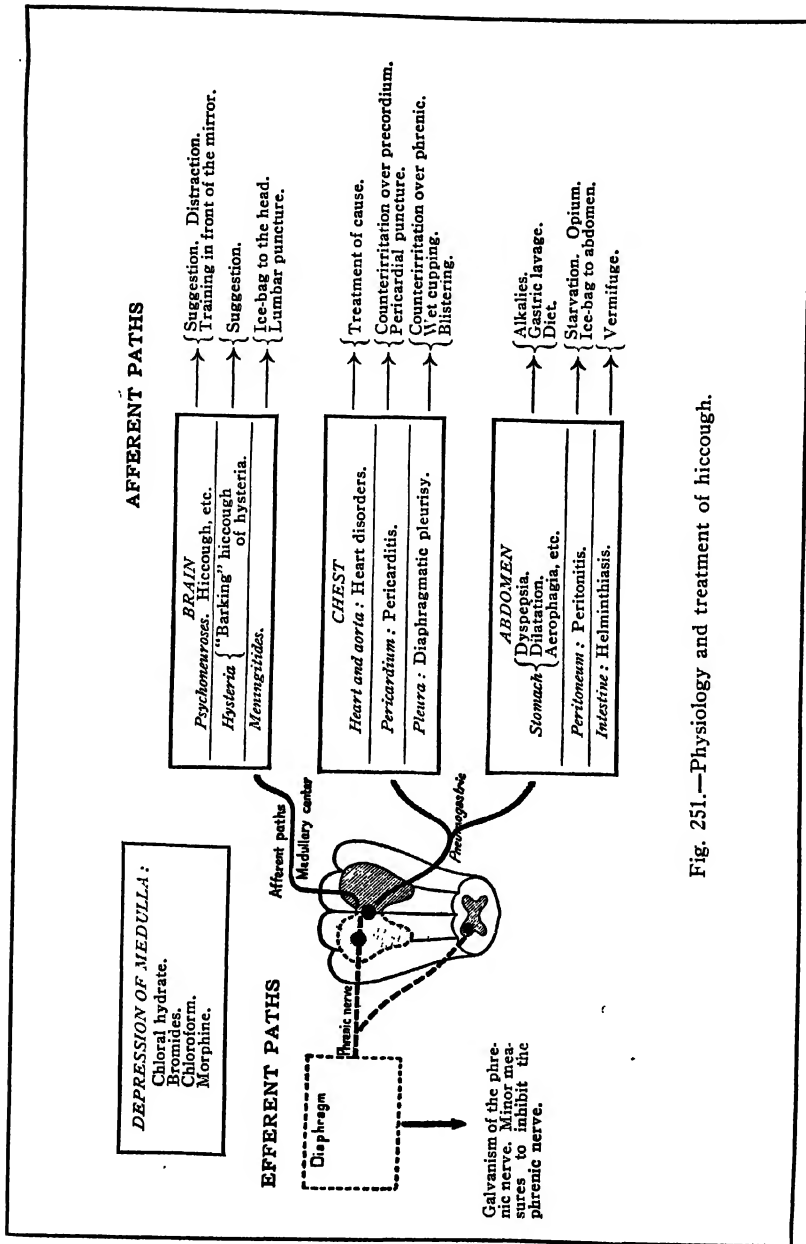


Fig. 251.—Physiology and treatment of hiccup.

HIGH BLOOD-PRESSURE.

High blood-pressure, it cannot be repeated too often, is not a disease, but a symptom, which is common to disorders widely diverse and of complex pathologic physiology. Accordingly, there is no specific for high blood-pressure, and *there is no drug which specifically lowers blood-pressure*. There is even no single treatment for lowering blood-pressure, and the therapeutic plan to be followed should be adapted to the existing clinical and pathophysiologic modality of high blood-pressure.

* * *

High-pressure cases may be divided, for practical purposes, into four groups which are rather easily differentiated (see "*Clinical Diagnosis*"):

1. **Plethoric cases**, sometimes gouty, diabetic or obese, full-blooded and well compensated for a long time.

2. **Angiospastic cases**, nervous, emotional, overexcitable, sometimes overworked, poisoned, with predominance of vasomotor disturbances.

3. **Nephritic cases**, with or without albuminuria. All the nephritides, acute or chronic, are accompanied by high blood-pressure. Many of the classic manifestations of Bright's disease, *e.g.*, hemorrhages, vertigo and increased output of urine of low specific gravity, are common to it and to arteriosclerosis.

4. **Arteriosclerotic cases**.—Arteriosclerosis or fibrous degeneration of the arteries constitutes merely a late stage, the ultimate result—after a varying lapse of time—of plethora, angiospasm, nephritis and arterial infections, foremost among which are *syphilis* and *malaria*.

The above elemental classification, which holds good both from the clinical standpoint and that of pathologic physiology, affords a practical foundation for the treatment of high-pressure cases.

The treatment of *high blood-pressure* may be worked out as follows:

1. **Is the high blood-pressure continuous or intermittent?**—If it is intermittent, it is generally the result of a congenital or acquired nervous erethism with exaggeration of the power of reflex vasoconstriction and angiospasm. Treatment should be prescribed on this basis:

(a) *Diet*: Abstention from stimulating foods, including alcohol, spices, condiments, etc.

(b) *Hydrotherapy*: Affusions; prolonged lukewarm tub baths.

(c) *Psychotherapy*: Systematic rearrangement of the patient's mode of life; psychomotor reëducation, etc.

(d) *Sedative medication*: Valerian, borneol derivatives, bromides, hypnotics containing bromine radicals (adalin, bromural, etc.).

2. The high blood-pressure is continuous. Is it organic or functional?—Correlation of the differential (pulse) pressure, blood viscosity and urinary output will permit of definitely settling this question, and from the solution obtained the treatment to be instituted will depend.

3. The high blood-pressure is permanent. Shall the attempt be made to lower it?—If it is of the functional type, it is nearly always curable, and completely so; an attempt at radical cure must be made.

If it is organic, it is partly irreducible: There is a limit of the systolic pressure below which the pressure cannot be lowered without detriment to the myocardium; there will also be a zone of tolerance within the limits of which one should strive to keep the patient; clinical and blood-pressure observations will permit of ascertaining the exact limits and extent of this zone.

Observation shows that in pathologic high blood-pressure, *there is an irreducible lower limit of high pressure below which one succeeds in lowering the systolic pressure only by upsetting the cardiovascular balance to the detriment of the myocardium, by transforming the case of compensated high blood-pressure into a case of cardiac insufficiency.*

For practical purposes it may be regarded as a fact that: *Any reduction of the systolic pressure which is accompanied by a rise of the diastolic pressure is an index of failure of the myocardium, and is of ominous significance.*

Any progressive reduction of the systolic pressure which is accompanied by an appreciable reduction of the diastolic pressure is an index of a true primary low blood-pressure, and is generally of favorable significance.

Clinical observation shows, however, that *in a given case of high pressure, there is an irreducible lower limit of high pressure which cannot be overstepped without prejudice to the myocardium.*

4. Functional high blood-pressure the result of plethora.—In such a case radical cure can and should be attempted (see section on *Plethora*).

The treatment may be summarized in the following four items:

(1) *Diet*, featured by reduction of the *total* amount of food taken and more particularly of the sugars and starches, fats and fatty articles, salt and salty articles.

(2) *Myotherapy*, consisting of progressive physical training by gymnastic exercises and sports.

(3) *Hydriatic and hydrotherapeutic cures*; diuretic treatment.

(4) *Various courses of drug treatment*:

(a) Alkaline and purgative.

(b) Diuretic and uricolytic.

(c) Iodides for reduction.

This question will be found freely discussed in the special section on *Plethora*.

5. Organic high blood-pressure due to vasculorenal sclerosis in the stage of compensation.—Under these circumstances the indications are altogether different.

(a) As regards the **diet**, *definite and pronounced reduction of the total amount of food taken*, and more particularly of the proteins and chlorides, is even more imperative than in the cases of functional high blood-pressure, since in the organic cases the reserve power of the heart and kidneys is slight or *nil* and overfeeding in proteins or chlorides exposes the patient both to uremia and heart failure. Meats should be reduced to 60 or 80 grams or even forbidden entirely at intervals; milk and vegetable days, without chlorides, should be introduced once or twice weekly. It cannot be stated too often, however, that any of these diets—especially if they are strict—should be instituted only with caution, and that the risk and danger of impaired nutrition and cachexia are by no means imaginary. The diet, then, should be low in proteins and in chlorides—but not too much so—and, under guidance of the chloride and urea elimination, should be made as liberal as possible. This should all the more be the case since, as I have many times observed, retention of water and retention of nitrogen and chlorides do not always run parallel. (See *Diseases of the Kidneys*.)

(b) As regards the **intake of water** in these cases, *there is good reason to reduce it concurrently and pari passu with the restriction of proteins and chlorides*. One may even go further and add that in these patients with high blood-pressure and low viscosity, who are certain to be hydremic, restriction of water intake is imperative always. On the other hand, since they do not necessarily show nitrogen retention nor chloride retention, or at least since they show these conditions in some instances only in a small degree, the allowance of proteins or of chlorides may be rather liberal; each item requires separate investigation. The reserve power of the heart and kidneys being slight or *nil*, a large allowance of water would uselessly overburden these organs, and many are the patients in whom I have seen anginal manifestations or obstinate epistaxis cease, high blood-pressure descend

by several centimeters of mercury, evidences of water retention disappear, absorption of edematous accumulations in various situations occur, a considerable reduction of weight (several kilograms) result, etc., exclusively as the result of a considerable restriction of water intake.

In cases of renal fibrosis the output of the glomeruli is reduced; I believe I have sufficiently demonstrated this in other publications. They can be made to yield a normal output only by an excess of blood-pressure. It is, therefore, quite useless to impose upon them a polyuric diuresis, which is dangerous and may even be fatal.

As a matter of fact, a *reduction of water intake* sufficient to bring the urinary output down to 1 liter or at most $1\frac{1}{4}$ liters results almost invariably in: 1. A reduction, sometimes considerable (30, 40 or 60 mm. Hg), in the systolic pressure, with a less, but distinct reduction in the diastolic pressure, with resulting relief of the heart, manifested in improved breathing, a subjective feeling of well-being, etc. 2. Reduction of body weight through diminution of the blood plethora and of the latent or manifest tissue edema. 3. Rise of the blood viscosity through diminution of the hydremia. 4. Disappearance of many morbid manifestations, especially such as relate to the cardiovascular system.

The degree of reduction of fluids should be based on observation of the output and specific gravity of the urine. The output should be brought down to about $1\frac{1}{4}$ liters; the specific gravity should never exceed 1018; the urine passed should be of light color, without uratic or phosphatic deposits. These conditions will be obtained, of course, only provided the diet contains a normal moderate amount of proteins (at most 100 grams of meat, fowl or fish, one egg, and 200 c.c. of milk) and a normal, moderate amount of chloride (at most 2 to 4 grams). With these provisos, *restriction of water intake is the most powerful blood-pressure-lowering measure known.*

The physician should bear in mind that in organic cases of high blood-pressure, no practice is attended with greater risk than hemorrhage-promoting polydipsia and no practice is more effective in lowering pressure than reduction of fluid intake.

As already stated, 1 to $1\frac{1}{2}$ liters of fluid, including soups, is an amply sufficient allowance for these subjects provided their diet is low in proteins and in chlorides. The fluid taken at the noon and evening meals should, therefore, be cut down to 200 cubic centimeters, which, with the 200 cubic centimeters of coffee or other beverage at breakfast, the 300 cubic centimeters of soup at the evening meal and

the 200 or 300 cubic centimeters of fluid taken between meals, will make up a liquid allowance of about $1\frac{1}{4}$ liters.

(c) Uricolytic drugs are of little value in these cases. On the other hand, it is justifiable to resort intermittently to **vasodilators**, especially such as affect the kidneys, in order to obtain the maximum of output from these organs and, if possible, maintain what still remains of elasticity in the renal vessels. *Digitalis* in small doses such as dilate the renal vessels (*e.g.*, 0.0001 gram— $\frac{1}{650}$ grain—of the French official digitalin—digitoxin—twice a week); *theobromine* and its derivatives, with or without *sodium benzoate* and *lithium salts* (0.5 gram— $7\frac{1}{2}$ grains—twice daily for ten days in each month), and *cinchophen* in the same dosage, will prove of actual service.

Conversely, *iodine* and the *iodides* are nearly always absolutely contra-indicated. If the patient has a tendency to iodide retention, as is almost always the case, ill-considered administration of iodides will expose him to a paroxysmal attack of hydremia with high blood-pressure and hemorrhages.

An alternating scheme of medication should be instituted in these cases three to six times a year, as follows:

Every alternate month, for example:

Mondays and Thursdays, at 10 A.M. and 4 P.M., in a little sweetened water, 0.0001 gram ($\frac{1}{650}$ grain) of crystallized digitalin (French) or one of the following pills:

℞ <i>Digitalis pulveris</i>	0.05 gram (gr. $\frac{3}{4}$);
<i>Scillæ pulveris</i>	0.1 gram (gr. iss);
<i>Resinæ scammoniae</i>	0.05-0.15 gram (gr. $\frac{3}{4}$ -iiss).
Ft. pil. No. i.	

Tuesdays and Fridays, at 10 A.M. and 4 P.M., with a swallow of water, one of the following cachets:

℞ <i>Sodii benzoatis</i>	0.2 gram (gr. iij);
<i>Lithii benzoatis</i>	0.3 gram (gr. v);
<i>Theobrominæ</i>	0.5 gram (gr. viiss).
Ft. cachet. No. i.	

Wednesdays and Saturdays, at the end of the noon and evening meals, in a cupful of some simple infusion, two or three teaspoonfuls of the following preparation:

℞ <i>Acidi phosphorici diluti</i>	36 c.c.	(f3ix);
<i>Sodii biphosphatis</i>	20 grams	(3v);
<i>Aquæ destillate</i>	170 c.c.	(f3vj).—M.

(d) **Physical exercise** should be reduced to its simplest and least active forms—rubs, massage, passive movements, graded walks over flat or slightly rising ground, breathing exercises under supervision,

etc., as the reserve power of the heart is low. In brief, whereas *almost intensive physical training* is indicated in functional high blood-pressure, *relative rest* is necessary in organic high pressure.

(e) Systematic **purgation** for purposes of detoxication and depletion is much more imperative than in functional high pressure.

It is especially in these cases that *combined starvation and purgation cures* (Guelpa's treatment) are of the greatest service. I have used them with excellent results in many cases of threatening uremia with a tendency to heart failure.

The same is true of systematic *local blood-letting* (wet cupping in the lumbar regions every week or two) or *venesection*.

Suitable *care of the skin*, including general rubs, is also strongly indicated in these cases. The skin, bowel, and lungs are the three structures which are capable of vicarious substitution for the kidneys; it is advisable to stimulate the eliminatory functions by all means at our disposal.

It will have been noticed that the therapeutic indications in the two forms of high blood-pressure, functional and organic, are distinctly different. Space does not permit of even a brief consideration of the transitional features relating to "border line" cases.

6. **During the angiospastic period** which intervenes between simple plethora and established fibrosis, the indications are already in part those of the latter condition. Yet, as I have shown elsewhere, this period presents certain very distinct phases from the standpoint of therapeutic indications: 1. *Interval phases* during which the patient behaves like a plethoric subject with somewhat reduced reserve power on the part of the kidneys and with a manifest tendency to excessive angiospastic irritability. 2. *Phases of angiospastic crises with high blood-pressure and diminished urinary output*.

During the interval periods, the treatment should be that of simple plethora with the following modifications and additions:

(a) *A somewhat less liberal diet*, with restriction more particularly of water, chlorides, proteins and stimulants (coffee and spices).

(b) *Greater moderation in exercise*, with exclusion of violent exercise and intensive sports. Simple exercises, walking and bicycle riding are suitable as the main activities in these cases.

(c) *Sedative hydrotherapy* in the form of prolonged hot baths twice weekly and lukewarm douches.

(d) *Sedative, antispasmodic medication*: The bromides, hyoscyamus and valerian are the most typical agents in this connection. The bromides are deserving of some further consideration at this point.

Without being able to offer a conclusive clinical demonstration of the fact, I wish to call attention to the very distinct diuretic action exerted in some subjects, more particularly, it seems, in the angiospastic high-pressure cases, by the bromides, the organic bromine compounds and especially the hypnotics containing bromine or bromide radicals, such as bromural (α -monobromisovaleryl urea), nyctal (bromodiethylmalonyl urea) and combinations of bromides with chloral hydrate, bromidia, etc. I have often seen the oliguria replaced by a manifest polyuria after the administration, either in small sedative doses or in a hypnotic dose, of one the above-mentioned preparations in subjects going through one of those attacks of oliguria with high blood-pressure the significance of which I have discussed at length elsewhere. Since this diuretic reaction was generally accompanied by a lowering of the diastolic pressure, with slowing of the pulse and manifest subjective betterment, it seems very probable that this effect was due to a renal vaso-dilatation consequent upon cessation of the angiospasm.

(e) It is in these cases that the *high frequency current* has appeared to me to exert the most manifest effect. While it is not constant, there seems to be no doubt that sometimes (not always) an antispasmodic, vaso-dilator action is obtained.

(f) Lastly, these patients are *emotive, hyperesthetic* subjects possessing an altogether abnormal reflex angiospastic hyperexcitability. Systematic *psychotherapy*, with thorough readjustment of the patient's mode of life, predetermined and supervised occupation of his time, the giving up of certain taxing occupations, and residence in a sedative climate, are sometimes capable of assisting greatly in allaying the nervous erethism.

During the hydremic attacks with high blood-pressure, treatment is required which may be summarized thus:

1. Quiet rest in bed.
2. Only water to be taken by the mouth (1 to 1½ liters of water or simple infusions in the twenty-four hours).
3. Vegetable or saline purgation.
4. Local blood-letting (wet cupping over the lumbar regions) or venesection.

As an auxiliary measure: Hot baths.

7. Organic high blood-pressure in the stage of decompensation and loss of circulatory balance.—In these late, complex and complicated cases, the pathogenic factors are many and interconnected. With the cardiac insufficiency are combined the various types of renal insufficiency (hydremia, chloridemia and azotemia); impaired pulmonary circu-

lation and bronchial obstruction tend to restrict oxygenation and increase the anoxemia; congestion of the liver and portal hypertension tend further to disturb metabolism, already profoundly vitiated; the toxemic factor and the glandular insufficiency resulting from these mechanical disturbances increase the mechanical disturbances themselves, as will be shown in relation to hyposphyxia; thus, a vicious circle is produced.

To ascertain by painstaking clinical study and laboratory analysis how much of the disturbance appertains to each of these various factors, and especially, to estimate the relative participation of the cardiac insufficiency and renal insufficiency; to dissociate the component features of these insufficiencies and to formulate in each case the opportune indications, while taking into account individual variations—such is the task of the clinician. Description of these practically individual clinical conditions, however, transcends by its very multiplicity the field of pathology to enter that of pure clinical medicine. Pathologic and therapeutic schemes can be drawn up in large numbers, the cases grouped, and their various types sketched; yet each individual case imparts its own modality to these conditions, and it is the talent and resourcefulness of the clinician—in contradistinction to the pathologist—which are called upon in the endeavor to differentiate what is specific from what is general, to discern the individual variety, shade and characteristic feature, and to adopt the special plan of treatment appropriate in the particular case. General rules remain the best guides, but there is no doubt that in the present incomplete, imperfect and barely outlined state of medical science, intuition must play a part in the problem.

For the details of treatment the reader is referred to the sections on heart failure, uremia, hyposphyxia, hypersphyxia, acute edema of the lungs, etc.; by alternating and combining in suitable proportions the measures described for these several conditions, the treatment which meets the needs of the type of case under the physician's care can be worked out.

Heart-tonics, diuretics, purgatives, local blood withdrawal and venesection, and hypodermic injections of oxygen gas should constitute the main factors in the treatment, in combination with a markedly restricted diet (with especial—but not excessive—reduction of proteins and chlorides) and almost complete rest—mitigated by passive movements, massage and, during the periods of relative compensation, a little walking on flat, sheltered ground.

(See also the sections on *Renal Insufficiency*, *Cardiorenal Syndromes*, *Heart Failure*, *Arrhythmia*, etc.)

8. *In either case, by what indication shall it be known that the effect of the treatment instituted has been favorable, that the reduction of blood-pressure has been obtained through reduction of the blood viscosity or vascular relaxation and not at the expense of the heart-muscle?*—Apart from the clinical evidences (disappearance of edema, etc.) and subjective evidences (feeling of well-being), by the fact that a slight reduction of the diastolic pressure accompanies the reduction of the systolic pressure. I repeat, **any reduction of the systolic pressure accompanied by a rise in the diastolic pressure is of ominous significance**, pointing to a yielding of the myocardium; the victory thus achieved is of the Pyrrhic variety.

TREATMENT FOR LOWERING BLOOD-PRESSURE.

I. DIET.—Certain general rules apply to the dietetic management of high blood-pressure, aside from the special variations required in the individual case:

1. **Reduction of the Aggregate of Food Taken.**—The exact extent of such reduction should be based on the physical type, habits and general activity of the individual in question. Digestive plethora is the rule in these patients. They always overeat absolutely or in comparison to their digestive capacity.

2. **Reduction of Proteins.**—There is advantage in carefully regulating the amount of food proteins, of whatever source. The normal daily allowance of proteins in the adult may be put down as approximately 90 grams. There is advantage in restriction below this figure in the presence of high blood-pressure, especially if the latter is accompanied by renal insufficiency. In cases of advanced chronic nephritis, reduction of the protein intake to 60 or even 50 grams may be indicated. The diet may be more liberal if the disturbance is more vascular than renal in nature, and if the patients digest fats and carbohydrates poorly. As the extractive substances in meats raise the blood-pressure, boiled meats may be allowed in larger amounts than broiled meats. Cereals, green vegetables, fruits and starchy articles should make up most of the diet; coffee should be forbidden and alcohol allowed only in very small amount.

3. **A strict milk diet** is not suitable as a continuous diet for high-pressure cases; 3 liters of milk are required to provide enough calories, and this quantity of milk contains 120 grams of casein, which, as we have seen, is too much, and 3 liters of water, which is no less excessive.

On the other hand, an exclusive milk diet may temporarily be of the greatest service, the amount being, however, reduced to 1 or 2 liters.

When the blood-pressure is excessively high and there is reason to fear cardiac or cerebral complications, a diet composed exclusively of milk and cereals may be most useful.

In some cases, especially when there is a toxic factor, there may be observed an extreme degree of vasomotor irritability which exposes the patient to abrupt and dangerous variations of blood-pressure. A blood-pressure already abnormally high may suddenly rise 40 or 50 mm. Hg higher and bring on heart failure or apoplectic manifestations. In renal cases these sudden attacks of high blood-pressure are generally of uremic origin. Under such circumstances an exclusive milk diet, a farinaceous and fruit diet, or even restriction to a minimum amount of water may be necessary.

4. Restriction of Fluids.—The amount of fluid ingested does not materially modify the blood-pressure as long as the heart and kidneys are functioning normally. Accordingly, one may and should be liberal and even prescribe diuresis "cures" in plethoric patients with unimpaired hearts and kidneys.

When indications of cardiac and cardiorenal insufficiency appear, however, and when the output of urine is low, restriction of fluids becomes necessary; under these conditions an average of 1000 to 1200 cubic centimeters (34 to 40 ounces) of fluid may be allowed.

5. Restriction of Salt.—If there is edema, salt should be strictly excluded from the diet. In the opposite event, it should be allowed in much restricted amounts. In high pressure cases it is always advantageous to forbid the addition of salt to cooked foods by the patient himself.

II. PHYSICAL THERAPY.—Sedative hydrotherapy in the form of tepid sponge baths and showers in angiospastic and sclerotic cases.

Cold stimulating hydrotherapy in the form of cold sponge baths and douches in plethoric subjects with good compensation.

Carbonated baths, useful in all cases except those with anginal attacks accompanied by low blood-pressure, marked azotemia, cardiac asthma, and pulsus alternans.

Massage in its various forms, useful in all cases. Douche-massage (Aix-les-Bains) and abdominal massage, especially serviceable in plethoric and gouty cases.

Graduated myotherapy, advantageous to all.

The gentlest forms of exercise, such as walking on level ground, are indicated in the sclerotic cases.

The moderately active forms, such as horseback riding and quiet tennis, in the angiospastic cases.

The more violent forms, such as gymnastic exercises, running, various sports, fencing, and swimming in the plethoric cases.

Thermotherapy: Hot air baths and douches.

High frequency: Useful in angiospastics, of doubtful utility in sclerotic cases and valueless in plethora.

X-ray exposures over the suprarenal glands (?).

Electric arc-light irradiations (?).

III. DRUG TREATMENT.

1. Iodine and iodides: Useful in plethoric cases, of moderate utility in angiospastics, dangerous in sclerosis.

2. Calmatives, sedatives and hypnotics: Valerian, cratægus, bromides, chloral hydrate, amidopyrin, etc.; useful in all cases in varying degree and at different times.

3. Uric acid solvents: Piperazin, lycetol, urazin, etc., serviceable mainly in plethoric cases.

4. Diuretics: Theobromine, caffeine, digitalis, squill, onions, etc., useful chiefly in cardiorenal cases.

5. Purgatives: Sodium sulphate, scammony, etc., useful in all cases.

6. Agents lowering blood viscosity: Hydriatic cure, injections of oxygen gas, and iodides, valuable in plethoric cases; lemons, sodium citrate and calcium chloride in small doses, sometimes useful in sclerosis.

7. Vasodilators: Amyl nitrite, distinct but fugacious effect.

Nitroglycerin and erythrol tetranitrate, special action on anginoid attacks.

Other nitrites, efficacy doubtful; actually toxic to the heart-muscle.

Digitalis in small doses.

Tincture of garlic, 10 per cent., 20 to 30 drops in a single dose (Loeper).

The antispasmodic sedatives, *viz.*, bromides and chloral hydrate, act secondarily as vasodilators.

The following combination has often proven very serviceable in my experience:

℞ Chloralis hydratis	2 grams (5ss);
Tincturæ valerianæ	3 c.c. (ʒxxlvijj);
Strontii bromidi	6 grams (ʒiiss);
Aquæ destillatæ	150 c.c. (f3v).

M. Sig.: One tablespoonful in the morning and the evening.

8. Ovarian extract at the menopause.

9. Specific agents: Arsenic and mercury in syphilis; quinine and arsenic in malaria.

IV. BLOOD-LETTING, either *local*, as by wet cupping in the lumbar regions and over the liver, or leeching over the mastoid, or *general*, as by venesection or vein puncture, useful in all cases.

CAUSES AND TREATMENT OF HIGH BLOOD-PRESSURE.

Permanent High Blood-Pressure.				
PATHOGENESIS.	CAUSE.	GENERAL FEATURES.	CHIEF CLINICAL SIGNS.	IMPROVED BY :
Plethora. <i>Simple plethora.</i> <i>Gout.</i> <i>Diabetes.</i> <i>Obesity.</i>	Inheritance.	Stable high pressure, of intermediate degree (180-220) and reducible for a long period.	Middle-aged subjects, 30 to 50. Full-blooded appearance.	<i>General dietary reduction.</i>
	Overeating.	High blood viscosity, in proportion.	Phenomena of active congestion.	<i>Exercise treatment.</i>
	Sedentary mode of life.	High specific gravity of the urine.	Polyuria, polyphagia and polydipsia.	<i>Iodine and iodides.—Uric acid solvents.</i>
			"Arthritic" manifestations (gout), glycosuria, hemorrhoids.	<i>Purgatives.—Hydratic cures.</i>
Angiospasm. <i>Neurovascular</i> <i>erethism.</i> <i>Emotional hyper-</i> <i>excitability.</i>	Neurotic ancestry.	Unstable high pressure, of intermediate degree (180-220), paroxysmal.	Pale, often sickly appearance.	<i>Systematic rearrangement of the mode of life.</i>
	Overwork.	Blood viscosity very variable.	Vasomotor disturbances (pallor, redness).	<i>Psychotherapy.</i>
	Insomnia.		Paroxysmal attacks, pseudo-angina, etc.	<i>Hydrotherapy.</i>
	Intoxications.		Nervous erethism, neurotic stigmata, exaggerated reflexes.	<i>Nerve sedatives.</i> <i>Bromides, valerian and borneol esters.</i> <i>Chloral hydrate and other hypnotics.</i>
Acute Nephritis.	Lead poisoning, tobacco poisoning.	Markedly high and but slightly reducible blood-pressure.	Febrile infectious condition.	<i>Milk diet.</i>
	Infections.	Increased blood urea.	Albuminuria, casts, hematuria.	<i>Treatment to antagonize the infection.</i> <i>Reversive measures.</i> <i>Calcium chloride.</i>

Chronic nephritis.	Sclerosis.	Markedly high and but slightly reducible blood-pressure. Usually a low blood viscosity.	Increased volume of urine of low specific gravity; urination at night; albuminuria slight or wanting. Small hemorrhages; sometimes gallop rhythm. Minor evidences of Bright's disease (headaches, dizziness, numb fingers, cramps, epistaxis).	Diet low in proteins, chlorides and water. Revulsive measures (wet cupping). Diuretics and laxatives.
Sclerosis, end-result of Plethora, angio- spasm. Infections (syph- ilis). Senile degenera- tion. Nephritis.	Toxic factors (en- dogenous or exo- genous). Infections { Malaria. Syphilis. Typhoid. Senility.	I. Stage of compensation. Markedly high (220-300), permanent and in part irreducible blood-pressure. Low blood viscosity. II. Stage of decompensation. Decreasing high blood-pressure with in- creasing diastolic pressure. Progressive increase of blood viscosity.	Stage of compensation (cardio-renal symptoms). Evidences of peripheral sclerosis. Evidences of chronic aortitis. Evidences of interstitial nephritis. Stage of decompensation. Symptoms of progressive heart failure and uremia.	Diet low in proteins, chlorides and water. Wet cupping over the lumbar regions at monthly intervals. Revulsive measures. Digitalis, theobromine.

Accidental or Induced High Blood-Pressure.

A.—Accidental.—Exertion, walking, running, emotions, fever, surprise; hearty meal, overeating.

B.—Induced.—Tests of circulatory function.

NOTE.—The term hydropic coefficient is applied by the author to the ratio, $\frac{H}{P}$, of the daily urinary output, H, to the pulse pressure, P, as determined with the Pachon sphygmomanometer. It equals or exceeds 250 cubic centimeters in cases of simple plethora; is sometimes above and sometimes below 250 in angiospastic cases, and is always below 200 in sclerotic cases.

INSOMNIA.

[In, *negative*; somnum, *sleep*;
deprivation of sleep.]

Insomnia and pain are the two symptoms with which the physician is oftenest called upon to contend. Relief of these symptoms constitutes one of the most frequent and imperative objectives of medical practice.

Certain **fundamental facts** should always be kept in mind in the application of the necessary treatment.

1. Insomnia being extremely common and prone to recur in persons predisposed to it, there is no symptom which leads more readily to a drug habit. Indeed, hypnotic drug habits far exceed in numbers any others, especially among physicians.

2. There is no hypnotic the use of which, especially for prolonged periods, is free of harmful effect. All act in the long run as depressants to the nervous system, which may exert a disastrous effect on the functions of the various organs.

3. Accordingly, one should decide to resort to the use of hypnotic drugs only after having exhausted the extensive and varied series of non-medicinal sedative procedures. The mother whose child cries and does not want to go to sleep rocks him while singing some old favorite tune; if this proves ineffective, she gives him a lukewarm sedative bath, finds out whether a tooth is troubling him, and if so, rubs some soothing preparation over the gum. It is when all these measures have failed that she gives him some of the bromide mixture always kept at hand for such purposes, and finally, only after all her endeavors have proven fruitless, does the physician called in prescribe a true hypnotic, such as opium or chloral hydrate. We should always adhere to this time-honored sequence in this connection.

4. Yet, in the last analysis, insomnia is always a serious symptom, and sometimes a dangerous one if it is persistent. Of two evils, one should select the lesser, and on the whole, in many cases, a sleepless night is at times more harmful than 0.01 gram ($\frac{1}{100}$ grain) of morphine, 1 gram (15 grains) of chloral hydrate, or 0.5 gram ($7\frac{1}{2}$ grains) of barbital (veronal). The only actual danger in such a case is that of habituation and drug mania, against which too many precautions cannot be taken.

On the whole, the general treatment of insomnia may be outlined as follows:

1. **Treatment of the Cause.**—Insofar as is possible, it is by ridding him of the itch-mites that a patient with scabies will be enabled to sleep; the heart case will sleep when circulatory balance is reestablished; the coffee addict, when the coffee has been withdrawn, and the syphilitic, when specified treatment is instituted. In sleepless neuralgic patients, analgesic remedies will have to be given.

2. **General Hygienic Measures.**—(a) **DIET.**—Stimulants, such as tea, coffee and alcohol must be interdicted in the excited type of patient.

The evening meal should be reduced, and more particularly, stimulating foods of animal origin eliminated from it.

It should be noted, however, that there do, less commonly, occur cases of insomnia due to insufficient evening meals.

Dyspepsia, if present, should be treated.

(b) **PHYSICAL MEASURES.**—Exercise should be regulated in a rational manner. One patient will be made to sleep by a walk taken regularly after the evening meal; another, by discontinuing some exhausting sport. The cause and proper treatment for many a case of obstinate insomnia will be discovered through a detailed analysis of the manner in which the subject spends his time; his indiscretion may be one either of commission (physical pursuits pushed to a ridiculous excess) or of omission (unduly sedentary mode of life).

In all cases, the ordering of systematic *general and respiratory gymnastics* should form a definite part of the hygienic instructions, as should also a few procedures coming under the head of *sedative hydrotherapy*, adapted to the patient, climate, season and circumstances.

The room should be well ventilated and its cubic content be at least 20 cubic meters (706 cu. ft.); the temperature should be in the vicinity of 15° C. (60° F.); light and noise should be excluded.

The bed is of some significance. The use of a feather bed should be forbidden. A spring mattress with taut covering; a mattress that is not too soft, and a woollen blanket not of excessive weight are to be recommended.

The *position of the body* has a marked influence on the depth of sleep. In general, lying on the back should be avoided, as it predisposes to nightmares, anxious dreams, and congestion of the genital organs. The lateral position, with the body slightly curved, is to be preferred. As for the *position of the head*, anemic or nervous subjects should be advised to sleep with the head low and the lower extremities relatively high. Heart cases, on the other hand, should sleep with the head high.

The position of the bed has been the subject of study as well as, perhaps unwarrantably, of much jesting. Personally, I have no definite impression concerning this matter. I can supply, however, the following very suggestive observation: A lady of the neuralgic, hyperesthetic type established herself in the autumn in a large, comfortable bedroom. Insomnia set in and proved entirely refractory. The patient complained of experiencing, as soon as she retired, severe headache which she ascribed to the cold emanating from the wall with which the head of the bed was in contact. This sensation of cold was held to be imaginary by her associates. As the insomnia continued, however, and at the patient's behest, the bed was moved. This was followed by relief from the insomnia as well as the headache. Further investigation of the walls showed that the first wall, while very thick, was the outer wall of the house and actually did produce the effect of a radiator of cold, the temperature of the air in its vicinity being several degrees Centigrade lower than that of the room as a whole and more particularly, of the other wall, which was an inner partition and well sheltered.

(c) **PSYCHIC TREATMENT.**—Worry, serious annoyances, emotions and overstrain should be eliminated insofar as is possible.

The ideal procedure, however, would be to "recast" the patient's mental tendencies, to inculcate in him a species of philosophy which would enable him to stand without being upset and with comparative serenity worries, anxieties and emotions. This is an ambitious program, but one from which each one should be able to gain some advantage.

3. Physical Treatment Proper.—The more obstinate forms of insomnia require more definite physiotherapeutic procedures:

Hydrotherapy: Lukewarm sponge baths, shower baths, and prolonged wet packs.

Lukewarm baths at 32 to 36° C. (89.6 to 96.8° F.), continued for fifteen to twenty minutes, in the afternoon before supper, or before retiring, at least two hours after the evening meal.

Hot leg baths (up to the calves, taken in a pail) at 38 to 40° C. (100.4 to 104° F.) for ten minutes just before getting in bed.

Kinesitherapy: Massage, systematic and regulated gymnastics, interspersed with sufficient rest.

Static electricity: D'Arsonvalization.

Climatic treatment: Well sheltered country in a wooded region. Semi-mountainous climate.

The patient's temperament and mode of reaction should be carefully studied and a conclusion reached as to the suitability of a certain climate in his case.

4. Psychic Treatment Proper.—Particularly in persons who are habitually sleepless, insomnia often amounts to a phobia, against which neither suggestion in the waking state nor attempts at hypnotism avail, as there occurs an active counter-suggestion against the act of falling asleep. The phobia of sleeplessness, sometimes accompanied by peculiar nervous symptoms, seizes the patient when he gets in bed. This phobia is very hard to overcome. Persuasion, gentleness and coaxing should be tried, the patient being shown that, after all, insomnia is not a serious condition and that sleep will always set in in due time. Reading to distract the mind, hydrotherapeutic measures and the application of sedative compresses to which sleep-producing properties should be attributed, may be advised. The ultimate measure consists, with the coöperation of the druggist and the patient's associates, in giving hypnotic drugs in descending doses.

It is a customary and, indeed, almost instinctive procedure, in the presence of insomnia the result of some obsessive idea, to try to drive away this idea by mental distraction, counting, repeating the multiplication table, reciting poetry or a prayer, concentrating the attention on an imaginary form or colored spot, etc.

If sleep is slow in coming on, an attempt should be made to sidetrack the mind by wedging a new thought into that one which is constantly obtruding, in order to bring about a kind of mental confusion which will annul consciousness of the outside world and lead insensibly from a dreamy state to sleep. The same result can sometimes be obtained by reciting senseless rhymes, learned by heart, or by reading something boring. Kant recommended for the same purpose that the attention be fixed on some subject devoid of interest, in order to divert the mind from the idea which is keeping up the insomnia.

A third variety of psychotherapy—that on the highest plane of all—consists in “nursing” the pain which is causing the insomnia, and in training the spirit to stand the inevitable trials unflinchingly.

5. Pharmaceutic Treatment.—If all the above measures have been employed without success, hypnotic drugs will have to be given.

The reader will find in Part I, in the sections on *Sedatives*, *Hypnotics* and *Analgesics*, all necessary information relating to their mode of use.

Roughly, the following scale of sleep-promoting drugs may be drawn up:

Sedatives: Orange flowers, valerian, bromides.

Hypnotics proper: Chloral hydrate, barbital, dial, carbromal, sulphonal, somnifen.

Analgesic hypnotics: Opium and its derivatives.

Intelligent use of the individual hypnotics depends upon a fair knowledge of the **pathophysiologic mechanism** of sleep, and it seems of interest to recall, as an example, the respective indications for chloral hydrate and for morphine.

INDICATIONS AND CONTRAINDICATIONS TO CHLORAL HYDRATE AND MORPHINE FOR HYPNOTIC PURPOSES.

Chloral hydrate and morphine are probably—and with reason—the two most commonly employed hypnotics. They should not, however, be thought of as being interchangeable. While they may sometimes be administered with advantage in combination, they actually meet wholly different indications and should be prescribed only for definite reasons.

Chloral hydrate and morphine appear to be directly acting hypnotics, i.e., drugs inducing sleep by a selective, direct action upon the nerve cell. This constitutes, however, about the only property they have in common. Indeed,

1. *Opium and its derivative, morphine, exert, in moderate dosage—as Sydenham had plainly noted—a tonic action on the heart; under their influence the heart beats develop increased amplitude and power, the blood-pressure rises, and circulation through the viscera becomes more active.*

Chloral, on the other hand, is a cardiovascular depressant; under its influence the heart-beats become weaker and less frequent, the blood-pressure is reduced, and visceral circulation is less active.

2. *In the first stage, at least, opium and morphine produce evidences of cerebral stimulation (a property availed of by morphinists), in all likelihood through hyperemia of the brain and meninges and direct nervous action. The sleep induced is frequently associated with dreaming; sometimes it presents features suggesting the so-called "coma vigil."*

Chloral sleep, on the other hand, is not preceded by any stage of stimulation; it is in all respects comparable to normal sleep as to general features and duration.

3. *Finally, morphine is an analgesic agent of the first order, being the type of the pain-relieving drugs.*

Chloral, on the other hand, is neither analgesic nor anesthetic; pain prevents chloral sleep from coming on, while loud noises awaken the sleeping patient.

Such are the more salient differences between chloral hydrate and morphine. Their respective indications and contraindications are logically based on these differences in action.

Morphine, a cardiac and vascular stimulant, at least temporarily a stimulant of the brain functions, and an analgesic agent of the first order, is especially indicated in insomnia dependent upon or associated with neuro-vascular weakness or some painful disorder.

Such being the case, it is serviceable in *pain insomnia*, generally due to neuralgia or visceral pain, as well as *tabes dorsalis*, cancer, etc. In these cases, however, in order to obviate or postpone as much as possible the risk of morphine habit, it is well not to resort to it until after the entire list of pure analgesics, such as acetphenetidin, antipyrin, exalgin, salipyrin, etc., has been exhausted.

In the *insomnia of anemic or asthenic subjects* (inanition, convalescence, typhoid fever, pneumonia, etc.) or of persons *with weak heart action or low blood-pressure*, morphine, with or without the addition of heart tonics, remains the hypnotic of choice.

In these cases chloral hydrate, on the other hand, proves ineffectual or even usually does harm.

In the so-called *nervous insomnia*, however, *dependent upon overwork, excessive ideation, worry, mental excitement, mania, alcoholism, meningeal congestion, and high blood-pressure*, morphine not only proves ineffectual, but is frequently even dangerous. *Chloral hydrate is the hypnotic of choice* in these cases.

Lastly, there occur a large number of hybrid clinical species, and various "mixed" insomnias, which warrant combined use of the two drugs to some extent.

Such, for example, is the insomnia of overworked anemic subjects, the painful insomnia present in high blood-pressure (neuralgia in a case of arteriosclerosis), etc. Under these circumstances the combination of chloral with morphine, while it doubtless fails to afford an ideal pharmacodynamic procedure, constitutes a logical solution of the problem of sleep induction.

Were it necessary to summarize in one concise sentence the above considerations, it might be stated that:

Opium and morphine are indicated in insomnia associated with neuro-vascular weakness or pain; chloral hydrate, in insomnia related to neuro-vascular overactivity, without pain.

* * *

All the hypnotics have drawbacks, which are not the same with the different drugs. They have one feature in common, however, *viz.*,

the readiness with which the sleepless individual becomes a slave to their use. The most important points to be remembered are the following:

CHLORAL HYDRATE is a neurovascular depressant and is contraindicated in conditions of low blood-pressure with a tendency to cyanosis.

OPIUM and its derivatives tend to produce congestion and stimulate the heart, and are contraindicated in conditions of high blood-pressure with cerebral hyperemia and excitement.

BARBITAL, DIAL and CARBROMAL are generally well borne and, on the whole, may be recommended (see Part I: *Hypnotics*).

The SULPHONE DERIVATIVES, highly toxic to the blood (causing hematuria), are absolutely contraindicated in all conditions with blood impairment (anemia, hypoxemia, asphyxia) and in diseases of the kidneys; there is an increasing tendency to discard them entirely.

INTESTINAL HEMORRHAGE.

By A. LUTIER, M.D.

Therapeutic intervention in intestinal hemorrhage is directed to two main objectives: 1. Symptomatic treatment. 2. An attempt to eliminate the cause.

A. SYMPTOMATIC TREATMENT.—Intestinal hemorrhages arise either from the lower portion of the large bowel or from some point higher up.

In the first instance, the blood covers the stools and is generally red.

In the second instance, the blood is in intimate admixture with the stools; it may be red, but often it is black (melena).

I. The bleeding is from the lower portion of the large bowel: Rectal hemorrhage due to hemorrhoids or constipation, cancer of the rectum, etc.

1. *Check the hemorrhage:* This is done by means of cold, astringent rectal irrigations. The following hemostatic substances may be used in enemas:

Antipyrin, 4 to 6 per cent.

Decoction of krameria, 5 per cent.

Ferric chloride, 1 to 2 per cent.

Calcium chloride, 1 per cent.

Gelatin, 1 to 5 per cent., preferably in physiologic salt solution.

Serum of bled horses.

Styptic suppositories containing ergotin and extract of krameria or adrenalin may be used.

Cold compresses over the anus and lower abdomen.

2. *Prevent its recurrence:* Facilitate the bowel movements with cold enemas or mild laxatives.

Give internally: Hamamelis, hydrastis, ergotin.

II. The bleeding is from a higher portion of the digestive tract:

1. *Absolute rest in bed.* Movements to be avoided.

2. *Application over the abdomen* of compresses moistened with cold water, or better, an ice-bag, supported by a hoop and just touching the abdominal wall (protected by a layer of flannel) without resting on it.

3. *Mustard applications to the lower extremities*, to divert the tendency to hyperemia from the bleeding area.

4. *Enemas of hot water*, 48 to 50° C. (118 to 122° F.).

5. *Iced drinks*. Cracked ice to suck. Citric lemonade (citric acid, 4; lemon syrup, 100; water, to make 1000). Sulphuric lemonade (sulphuric acid, 2; syrup, 125 by weight; water, 875).

6. *Hemostatic drugs*: Injection of emetine hydrochloride twice a day.

Ergot preparations by the mouth or hypodermically.

Sulphuric acid, 1 part, in alcohol, 3 parts (by weight); dose, 2 to 8 cubic centimeters ($\frac{1}{2}$ to 2 fluidrams), greatly diluted.

Calcium chloride by the mouth. In intestinal hemorrhage in typhoid fever, Mathieu recommends combined administration of calcium chloride by the mouth with hot enemas (48° C.—118° F.) given twice daily under low pressure.

Ferric chloride.

Adrenalin.

Serum of bled horses, by the mouth or hypodermically.

Hepatic organotherapy (Gilbert and Carnot), in the event of failure of the other measures.

7. *Relief of pain and immobilization of the bowel*: Opium, laudanum or extract of opium, repeated at short intervals. If necessary, morphine hypodermically.

8. *If the general condition is disquieting*: Alcohol; coffee; injections of caffeine, ether, or camphor in oil.

If the case is one of *acute post-hemorrhagic anemia*, the patient's head should be lowered and the elevated limbs tied off with constricting bands; compression of the aorta may be availed of.

Blood transfusion, if possible, or subcutaneous—or if necessary, intravenous—injections of physiologic salt solution, 200 to 500 cubic centimeters (6 to 16 ounces), to be repeated in the course of the day, if required.

9. *After-care*.—When the hemorrhage has stopped, the stools should be watched for several days, both macroscopically and chemically (Weber's, Mayer's, and Thévenon and Rolland's tests).

After two or three days the opiates may be discontinued and the bowel cautiously cleaned out by enema, avoiding all movement of the patient.

Restoration of feeding should be carefully supervised. For the first few days, an exclusive milk diet; then, a nourishing diet of small bulk, leaving little residue, *e.g.*, ground meat, strained vegetable purées, eggs and cream.

The patient's general strength should be improved by giving *conso-
més*, meat juices, roborant wines and oxygen inhalations.

B. SPECIAL INDICATIONS, ACCORDING TO THE CAUSE.

—**Melena Neonatorum.**—Cold enemas, ice, and strong astringents would be rather harmful than beneficial.

(a) **If the hemorrhage is mild:** The child should be immobilized and moved as little as possible; water alone to begin with, then 10 c.c. ($2\frac{1}{2}$ fluidrams) of cold or iced mother's milk, administered with the spoon, every two hours. The child may be given small pieces of ice to suck, and if necessary a few drops of brandy.

(b) **If the hemorrhage is more severe:** Give a liquid preparation consisting of ergotin, 0.2 to 0.5 gram (3 to $7\frac{1}{2}$ grains), 15 c.c. ($\frac{1}{2}$ fluidounce) of syrup of krameria, and 20 c.c. (5 fluidrams) of peppermint water in teaspoonful doses every fifteen minutes.

Or, a suitable dose of a preparation of ergot for hypodermic injection may be given.

If required: Calcium chloride, 0.2 gram (3 grains) per year of age; adrenalin, 1:1000 solution, 5 drops in 30 c.c. (1 fluidounce) of water, in teaspoonful doses every hour.

Hypodermic injections of 10 c.c. of physiologic salt solution two or three times a day.

In the event of collapse: Hypodermic injections of ether, camphor in oil, or caffeine. Oxygen inhalations.

Rubbing with warm flannel, slightly moistened with alcohol, for five minutes, followed by wrapping of the lower half of the body in warmed cotton and the application of external heat in the form of hot water bottles.

To allay pain and restlessness, warm baths at 38 to 40° C. (100 to 104° F.).

If there is the least suspicion of congenital syphilis, institute specific treatment: Daily inunctions of 1 gram (15 grains) of mercurial ointment for ten minutes, or 1:999 mercury bichloride solution, 10 drops a day per month of age, given by the mouth in milk.

Typhoid Fever.—As soon as an abrupt fall of temperature occurs in a typhoid case, intestinal hemorrhage should be suspected and treatment prescribed.

The baths should be discontinued, nothing given by the mouth, and ice applied over the abdomen.

Dysentery.—Injection of antidysenteric serum in the case of bacillary dysentery, or of emetine, in the case of amebic dysentery.

Enemas, to be retained, of tannic acid (2 to 5 grams—30 to 75 grains—in 250 c.c.—8 ounces—of water) or of silver nitrate (in

adults: 0.2 to 0.5 gram—3 to 7½ grains—in 200 c.c.—6 ounces—of water; in children: 0.05 to 0.1 gram—¾ to 1½ grains).

Malaria.—In intestinal hemorrhage due to malaria, quinine should be given in large doses, combined with ergotin.

Hookworm Disease.—Male fern. Thymol. [Oil of chenopodium. Carbon tetrachloride.]

High Blood-Pressure. Arteriosclerosis. Supplementary Enterorrhagia.—In all these conditions treatment should be limited, at least at first, to a few hot enemas.

In old persons, intestinal hemorrhage, when not due to hemorrhoids or a tumor, is often the result of embolism or disease of the arteries to the intestine.

Diseases of the Heart. Embolism.—Treatment of the heart condition should be instituted.

Diseases of the Liver. Cirrhosis.—In the event of intestinal hemorrhage, hepatic organotherapy is indicated in these cases.

Chronic Ulcerative Colitis.—The bleeding sometimes necessitates local treatment of the ulcerations by cauterization or applications through the proctoscope.

Inoperable Cancer of the Bowel.—An artificial anus in the iliac region, by diverting the fecal flow, may assist in checking the bleeding.

Rectal Polyps.—When a child develops profuse intestinal hemorrhage, the possibility of a rectal polyp should at once be thought of. A local examination should be made with the proctoscope and an operation for removal of the polyp carried out.

Hemorrhoids.—The bleeding, when recurrent, may in the long run induce marked anemia and require operative intervention.

Duodenal Ulcer.—The hemorrhages may likewise require surgical intervention.

ITCHING.

The treatment of **itching** will naturally consist of a sulphur rub in a case of scabies, antidiabetic treatment in a case of glycosuria, liberation of the biliary passages in a case of jaundice, and sedative medication in a neuropath. It is, nevertheless, a fact that, independently of its original cause, itching can be dealt with at least by palliative measures, which the patients, indeed, insistently demand. This purely symptomatic treatment will not cure the itching if the cause of the latter remains, but it will often be capable of markedly allaying it, and this result, even if temporary, is not inconsiderable when one is dealing with so intolerable a symptom.

* * *

The pharmaceutic agents which sometimes exert a favorable effect on pruritus are mainly, as stated by Brocq, the *anesthetic agents* and the *reducing agents*.

1. **Anesthetic Agents.**—These are sedative, but not curative, remedies.

(a) *Acetic acid.*—This may be used in the form of:

Vinegar lotions.

Vinegar baths, 1 : 250; one liter of acetic acid in the bath.

Ointments:

R Acidi acetici	5 c.c.	(℥℥xxv);
Adipis lanæ hydrosi	10 grams	(℥iiss);
Petrolati	20 grams	(℥v).—M.

Pastes:

R Acidi acetici	2 to 10 c.c.	(f℥ss-iiss);
Adipis lanæ hydrosi,		
Petrolati,		
Amyli	āā 10 grams	(℥iiss).—M.

(b) *Tartaric acid.*—This could be substituted for the acetic acid in the above formulas.

It has been mainly used in a 1 : 30 admixture in starch glycerite.

(c) *Phenol.*—Used similarly in lotions, pastes or ointments, usually in 1 to 3 per cent. strength.

(d) *Cocaine* and *stovaine* are among the most commonly used local anesthetic substances. They are included in countless preparations for the relief of itching—lotions, pastes or ointments:

℞ Cocainæ hydrochloridi	0.5 gram	(gr. viiss);
Mentholis	1 gram	(gr. xv);
Petrolati	30 grams	(3j).

M. Sig.: For external use.

(e) *Menthol* is, with cocaine, the most commonly used of the antipruritics. It is employed in 1 to 5 per cent. alcoholic solutions and in ointments or pastes averaging 1 per cent. in strength.

℞ Mentholis	1 gram	(gr. xv);
Aquæ coloniensis	100 c.c.	(f3iiiss).

M. Sig.: Use as a lotion.

(f) *Methyl salicylate* in 2 to 10 per cent. concentration may be included in the composition of antipruritic pastes:

℞ Methylis salicylatis	1 c.c.	(m xv);
Mentholis,		
Camphoræ	āā 1 gram	(gr. xv);
Adipis lanæ hydrosi,		
Petrolati	āā 20 grams	(3v).

M. Sig.: For external use.

(g) *Benzoin* forms part of innumerable cosmetic preparations. The following antipruritic formula is recommended by Leredde:

℞ Tincturæ benzoini	3 c.c.	(m xliv);
Aquæ	5 c.c.	(m lxxv);
Petrolati	15 grams	(3ss);
Adipis lanæ hydrosi	30 grams	(3j).

M. Sig.: For external use.

Old formularies give the following recipe for "virginal milk":

℞ Tincturæ benzoini	10 c.c.	(f3iiiss);
Aquæ rosæ vel meliloti	400 c.c.	(f3xliiss).

M. Sig.: Use as a lotion.

The so-called "baume du Commandeur," much lauded by old-time authors, contains tincture of benzoin as its active component. [*Tinctura benzoini composita*, U. S. P., is a rather similar preparation, of about the same strength.]

The following *balsamic oil* may also be recommended:

℞ Tolu	1 gram	(gr. xv);
Tincturæ benzoini	1 c.c.	(m xv);
Olei amygdalæ expressi	110 c.c.	(f3iiiss);
Olei limonis		gtt. ij.—M.

Camphor forms the basis of certain esteemed antipruritic preparations:

℞ Chloralis hydratis	1 gram	(gr. xv);
Linimenti camphoræ	10 c.c.	(f3iiiss);
Adipis lanæ hydrosi	90 grams	(3ij).—M.
		(LEREDDE.)

℞ Zinci oxidi,	
Cretæ præparatæ	āā 25 grams (3vj);
Linimenti camphoræ,	
Liquoris calcis	āā 25 c.c. (f3vj).—M.
	(LEREDDE.)

Cannabis is sometimes likewise included in preparations for itching. The following formula is put up in stick form:

℞ Extracti cannabis	10 grams (3iiss);
Resinæ	5 grams (gr. lxxv);
Ceræ flavæ	45 grams (3iiss);
Olei olivæ	40 c.c. (f3x).—M.
	(LESTIKOW.)

2. **Reducing Agents.**—These are alike *sedative* and *curative*. There may be advantage in combining them with the preceding remedies.

Ichthyol is an oil obtained by the distillation of certain bituminous rocks and consists of carbides of hydrogen and of ill-defined sulphur, nitrogen and phosphorus compounds. It is used either in a 10 per cent. aqueous solution, in alcoholic solution, or in pastes or ointments. "When a deep-seated effect is desired, an ointment should be used. When irritation is feared, a paste should be employed instead" (Leredde).

Ointment.

℞ Ichthyolis	3 grams (gr. xlv);
Adipis lanæ hydrosi	10 grams (3iiss);
Petrolati	20 grams (3v).—M.

Paste.

℞ Ichthyolis	1 gram (gr. xv);
Zinci oxidi,	
Amyli	āā 10 grams (3iiss);
Petrolati	20 grams (3v).—M.

The *thiols*, allied to ichthyol, but weaker in action, decongestive and keratoplastic, are artificial ichthyols obtained by the action of sulphur on petrolatum oils; they are more bland and more easily managed than the ichthyols. The manner of use and formulas are similar.

Tumenol is similar to the preceding agents, and may be substituted for them.

The *tars* are more active but more irritating and harder to manage than the foregoing remedies. They must be completely avoided in acute conditions, but are particularly valuable in chronic, sluggish, obstinate, pruriginous conditions. In the latter cases their penetrating power may be increased by combination with soft soap. The following is a very active preparation, but one which should be used with great caution:

℞ Saponis mollis	5 grams (gr. lxxv);
Picis pini	10 grams (ʒiiss);
Petrolati	35 grams (ʒix).—M.
(LEREDDE.)	

Resorcinol, or metadioxybenzene, $C_6H_4(OH)_2$, is a very valuable reducing antipruritic, being alike one of the most effective of these and one of the easiest to manage. It may be used in aqueous or alcoholic lotions or in ointments or pastes of an average strength of 2 to 5 per cent.:

℞ Resorcinolis	2 to 4 grams (ʒss-j);
Aquæ destillatæ	100 c.c. (fʒiiss).
S. Sig.: To be used as a lotion.	

℞ Resorcinolis	2 grams (ʒss);
Amyli	10 grams (ʒiiss);
Adipis benzoinati	30 grams (ʒj).
Fac unguentum.	

℞ Resorcinolis	2 grams (ʒss);
Amyli,	
Zinci oxidi,	
Adipis lanæ hydrosi,	
Petrolati	10 grams (ʒiiss).
Fac pastam.	

Pyrogallol and *chrysarobin* could be used only for very small, papular, pruriginous patches.

* * *

Exclusion of Air.—The mere fact of preventing the contact of air with itching areas brings much relief to the patients.

In this connection, even the simple application of some almost neutral fatty substance is sufficient to yield some relief and the relatively perfect air exclusion afforded by *pastes* and *ointments* certainly accounts for a good part of their favorable effects.

"Zinc glues" are still more effectual. Following is their standard formula, according to Darier:

	FORMULA FOR THE WINTER	FORMULA FOR THE SUMMER.
Gelatin	15	30
Zinc oxide	15	10
Glycerin	25	30
Water	45	30

(As a matter of fact, the desired consistency, *viz.*, one such that the preparation will be a liquid on the water-bath at 50° C.—122° F.—and a solid at the body temperature, is obtained only by repeated tests, and it is well to request and rely upon the druggist to adjust the preparation so that it will be solid at body temperature.)

The preparation is fused on the water-bath before use, applied to the itching surface with a brush, and while it is cooling and is still rather viscid it is gently pressed upon with absorbent cotton, some of which will adhere and produce a downy, wooly layer favorable to the conservation of the dressing, which may remain in good condition for several days.

This protective exclusion of air may also be obtained with *simple* or *compound plasters* (zinc oxide, resorcinol, phenol plasters, etc.) or by painting the surface with substances forming a dry varnish, such as *tar* and analogous materials (coal tar, ichthyol, tumenol, thigenol, etc.).

* * *

Hydrotherapy in the form of lukewarm douches—35 to 38° C. (95 to 100.4° F.),—applied with but little force, is sometimes useful. Baths are poorly borne, as a rule. *Gelatin baths*, however, made by adding 250 to 500 grams (8 to 16 ounces) of gelatin, previously dissolved, to the bath, may give some relief.

Washing with hot water—42 to 50° C. (107.6 to 122° F.)—is sufficient to allay itching for a period of several hours in some cases.

* * *

There are a few **exceptional measures** for itching which may with advantage be held in reserve for obstinate cases.

High frequency, especially useful in *senile pruritus*.

X-ray treatment, which is of established utility mainly in *mycosis fungoides*.

Ovarian and thyroid medication, plainly useful in individuals with *endocrin insufficiency*.

Lumbar puncture, which is asserted to have proven effective in *certain kinds of obstinate pruritus* (Thibierge). Six to eight cubic centimeters of spinal fluid are removed on two or three occasions, e.g., in *lichen planus*, Besnier's diathetic *prurigo*, and some forms of *psoriasis*. The effect should be prompt—within a few hours—and pronounced. If the procedure fails, there is no advantage in trying it further.

* * *

In any form of itching, the following measures should not be forgotten:

1. Instructions as to *physical and mental hygiene*; these are important because of the neurotic element.
2. The frequent value of *evacuant, disinfectant and detoxicant medication* with cholagogues, purgatives, diuretics,

salicylates, benzoates and calomel; Guelpa's treatment may be tried in refractory cases. 3. Auxiliary *sedative medication* with valerian, belladonna, bromides or quinine hydrobromide is nearly always indicated. In the presence of insomnia, causing depression of the patient, there should be no hesitation in resorting to the hypnotics—barbital, nyctal, chloral hydrate, bromides, etc.,—remembering, however, that the last two of these drugs, while excellent in other respects, sometimes give rise to skin eruptions.

TREATMENT OF SOME LOCALIZED FORMS OF ITCHING.

PRURITUS VULVÆ.—It should be borne in mind that this condition is *always secondary*.

To a vagino-urethral discharge.

To different kinds of vegetations or skin disorders.

To the presence of parasites (oxyurides).

To **diabetes mellitus**, gout, herpeticism or pregnancy.

To alcoholism or tabes dorsalis.

To the menopause or neurotic disturbances.

All of these should, of course, receive suitable treatment.

As regards the treatment of the symptom itself, benefit will sometimes be obtained from:

Phenolated or thymolated lotions in strong solutions, or with Van Swieten's solution [a 1:1000 solution of mercury bichloride in a 1:9 mixture of alcohol and distilled water].

Wet dressings with diluted lead subacetate solution or a 3 to 5 per cent. decoction of [European] walnut leaves.

Application to the shaved vulva of compound tincture of benzoin, tincture of aloes, a 10 per cent. solution of ichthyol, or a 2 to 5 per cent. solution of silver nitrate.

Application of a pomade containing ichthyol or of the following type:

℞ Mentholis	0.05 gram	(gr. $\frac{3}{4}$);
Guaiacolis	0.25 gram	(gr. iv);
Zinci oxidi	10 grams	(3iiss);
Petrolati	30 grams	(3j).—M.

Lotions or compresses of decoctions of coca leaves, of belladonna (with caution) or of hyoscyamus.

Dusting powders of talcum, bismuth subgallate, zinc oxide, etc., or with a mixture of talcum, zinc oxide and bismuth.

PRURITUS ANI.—Exactly the same considerations apply here as in pruritus vulvæ.

The condition is almost certainly prevented by a sitz-bath after every defecation.

Aside from the measures already alluded to, the high frequency effluve over the affected region yields excellent and prompt results. The X-rays and radium have also given excellent results. These procedures may be held in reserve for the really refractory cases.

JAUNDICE (ICTERUS).

[ἰκτερος, *icterus*.]

BY LÉON MEUNIER, M.D.

Jaundice is a symptom which is manifested in discoloration of the conjunctivæ and skin and in changes in the urine and feces.

The above definition is the one which has been accredited since remote ages; but modern investigations seem about to change it radically.

Bile, as is well known, consists essentially of the bile salts and bile pigments, of which urobilin is a derivative.

The formerly accepted pathogenesis of jaundice explains the symptom as being due to retention of all the components of the bile following obstruction of the biliary passages (small or large) through cholangitis, the presence of foreign bodies, or pressure.

Modern clinical investigations have tended to show, however, that aside from the cases of bile retention through obstruction, there exists another group of cases in which the hepatic cells play a rôle of major importance, through inability sufficiently to excrete the pigment and bile-salts, which are therefore absorbed into the blood.

These studies have thus brought to our attention the following different forms of jaundice which we must be able to distinguish for therapeutic purposes:

1. **Hemolytic icterus.**—In this condition there is *no retention of bile salts* in the *serum*. The discoloration of the skin is due to a blood change, *viz.*, deglobulization.

2. **Latent forms of jaundice.**—In these forms no true jaundice is present. The skin is normal, or at most there may be noticed a slight xanthodermnia—that mild type of jaundice which does not involve the mucous membranes and is localized in the palms of the hands.

Sometimes, however, there is the dark pigmentation known as *melanodermia*, or there is *xanthelasma*, manifested in a slight accumulation of cholesterin, often localized at the inner angles of the lids, and which is to cholelithiasis what the tophus is to gout.

Chemical analyses alone will reveal urobilin or bile acids in small quantities in the blood.

This is a frequent form in various infections (typhoid fever, rheumatism) and in the diseases of the liver in which jaundice is not ob-

servable through clinical procedures alone (venous cirrhosis of the liver, cancer of the liver, etc.).

3. **Dissociated forms of jaundice.**—Here the hepatic cell plays the main rôle. Hence the changes it undergoes; it is capable of retaining in the blood-serum either the bile-salts or the bile-pigments, or a mixture of the two in varying proportions; the result is a pathologic condition which can be demonstrated only by chemical analyses but which may be present in a wide variety of infections. We may recall that, the bile salts having no staining power, the customary symptoms of jaundice are not observed in retention of these salts; hence, the condition is far from corresponding to the classic definition of jaundice.

4. **Frank icterus.**—This corresponds to the classic definition of jaundice and is the result of obstruction of the bile-ducts, of internal or external origin, or of cholangitis, whether it be due to an ascending infection from the intestine, as was formerly thought to be always the case, or to a descending infection consequent upon discharge from the liver of germs contained in the blood in various forms of septicemia, as is now believed likely, elimination of the typhoid bacillus with the bile being considered to be constant during the course of typhoid fever.

It should be noted further that, in cases of catarrhal cholangitis, the inflammatory process never induces obstruction of the bile duct; jaundice in these cases is due to the manifestations of hepatitis.

In view of these facts, the diagnosis of icterus will not necessarily be obvious to the clinician, who in many instances will be able to detect its presence only by chemical studies of the urine, serum and feces. With the diagnosis of icterus made, the physician has still to make an etiologic diagnosis, and in this connection the subjoined table may be of service.

CAUSES RELATING TO THE BILE-DUCTS.		CAUSES RELATING TO THE LIVER.
INTERNAL CAUSES.	EXTERNAL CAUSES.	
<i>Stone in duct.</i> <i>Catarrhal jaundice.</i> <i>Cicatricial stenosis.</i>	<i>Cancer of pancreas.</i> <i>Lymphatic tumor.</i> <i>Peritoneal band.</i> <i>Bilio-hepatic cancer.</i> <i>Abscess or cyst of liver.</i>	<i>Simple catarrhal jaundice.</i> <i>Infectious jaundice.</i> <i>Grave icterus (generally secondary), hepatic cirrhosis, typhoid fever or malaria.</i>

The above enumeration plainly shows the diversity of treatments required in these conditions.

Thus, all cases in which the jaundice is due to external pressure will require surgical rather than medical treatment.

A stone in the duct will produce pain which will dominate the entire treatment.

Jaundice of syphilitic or malarial origin will require the appropriate specific treatment.

Obviously, the treatment of severe phosphorus jaundice should be that of the phosphoric intoxication—stomach washing and the administration of copper sulphate and calcined magnesia.

A toxic or infectious jaundice will require such treatment as will effectually counteract the toxic or infectious condition.

Icterohemorrhagic spirochetosis, the latest form of infectious jaundice to be described, furnishes the best example of what can be done toward the prophylaxis of infectious jaundice. Disinfection of the urine, the search for carriers of the infection, and the destruction of rats have proven capable of reducing the frequency of the disease.

The causal treatment of the various forms of jaundice is thus of prime importance.

Yet, all these conditions present certain features in common which require like treatment.

The Diet.—The feeding of jaundiced cases is governed by the important single feature: Insufficiency of bile flow..

The labors of Claude Bernard and of Pastre demonstrated that the bile and pancreatic juice take part simultaneously in the elaboration of the fats in the food and their absorption from the intestine. The most recent physiologic investigations, however, including examinations for hemoconia in the blood, have shown that *the bile plays the principal rôle in the absorption of fats.*

From the therapeutic standpoint, the practical conclusion is that the amount of fats allowed in the diet should be reduced, whence the need of a diet approximating the following requirements:

But little in the way of fats, and no cooked fats.

Plenty of fluid.

To institute such a diet in the presence of jaundice, skimmed milk should be given (2 liters a day, in small cupfuls).

The skimmed milk may be replaced by defatted kephyr, yoghurt with sugar, and particularly, soups made from vegetable broths.

It will often be better, for the purpose of regeneration of the liver parenchyma, to give at once a diet rich in carbohydrates—pastes, purées, and highly sweetened drinks.

The diet of milk and vegetables or the vegetarian diet should be continued as long as digestive or renal disturbances persist.

Intestinal Peristalsis.—The absence of bile from the intestine leads to constipation, which may be treated with the following measures:

Daily cold or lukewarm enemas.

Bile in capsules.

Or:

Sodium citrate or sulphate, 2 to 5 grams (30 to 75 grains) in the morning on an empty stomach, dissolved in a glass of hot Vichy water.

Intestinal Antisepsis.—The antiseptic rôle of the bile in intestinal digestion should not be overlooked.

It should be recalled, however, that in the infectious forms of jaundice, the obstruction to the excretion of bile is located in the liver cell. The utility of antisepsis of the biliary channels therefore becomes open to question; to administer drugs for this purpose would be to exert the effect at a level below the obstruction.

The antiseptic agents most commonly used may, however, be mentioned:

℞ Hydrargyri chloridi mitis	0.05 gram (gr. $\frac{3}{4}$);
Lactosi	0.2 gram (gr. iij).

M. Sig.: To be taken at one dose.

Calomel should always be given in small doses, as it may irritate the bile ducts. It is best to limit the dose to 0.02 gram ($\frac{1}{8}$ grain) during ten days. If mercurial stomatitis should set in, the drug should be at once stopped.

From 1 to 3 cachets in the twenty-four hours should be given.

Or:

℞ Sodii salicylatis,	
Sodii benzoatis	ãã 0.5 gram (gr. viiss).

Pone in caps. amyl. No. i.

Or, methenamine may be given in a dosage of 2 to 3 grams (30 to 45 grains) a day.

It is possible also to give methenamine by daily intravenous injection of 8 cubic centimeters (2 fluidrams) of a solution containing 0.25 gram (4 grains) of the drug per cubic centimeter.

Action on the Hepatic Cell.—In the presence of infectious jaundice, one should endeavor to act particularly upon the liver cells.

In this connection the experimental researches of Davis and Whipple are of great interest. Studying in the dog the regeneration of the liver parenchyma, these observers showed that this regenera-

tion takes place with a rapidity that varies greatly according to the diet to which the animal is subjected; one of the most favorable diets is one rich in carbohydrates, and it has long been known that most of the liver functions run a course paralleling that of the glycogenic function. Hence it seems indicated not to subject jaundiced patients to a starvation diet, but to give them carbohydrates in considerable amount; even if gastric intolerance prevents the feeding, this object may be attained by giving heavily sweetened hot infusions in abundance. It is doubtless in this manner that the treatment recently recommended by P. Emile-Weil acts; he recommends in jaundice giving daily by rectal drip 1 liter (quart) of water to which have been added 45 grams ($1\frac{1}{2}$ ounces) of dextrose and 1.5 grams (23 grains) of methenamine.

Cholagogues.—Cold rectal injections, bile in gluten-coated capsules, glycerin, and olive oil are all recommended. Their action is, however, questionable. At the most they cause a contraction of the gall-bladder; they cannot act on the liver cells. Vincent Lyon has recommended the intraduodenal injection of a 20 per cent. solution of magnesium sulphate, which leads to a profuse flow of bile. For this procedure may be substituted gluten-coated pills of magnesium sulphate, which will dissolve only in the duodenum.

Itching.—Itching may become one of the most distressing symptoms of jaundice. One of the following measures may be tried:

Lukewarm baths or warm douches.

One per cent. phenol solution as a lotion.

Menthol or ichthyol in 1 per cent. solution in alcohol.

Injections of pilocarpine hydrochloride, 0.005 to 0.01 gram ($\frac{1}{12}$ to $\frac{1}{6}$ grain).

Treatment of Jaundice in the Stage of Convalescence.—One of the therapeutic resources at the physician's disposal is a stay at one of the thermal resorts of the type of Vichy, which produce mainly a cholagogue effect and regularize the flow of bile.

Hemolytic Icterus.—The treatment should be directed to the blood disturbance. It should, however, be of the etiologic type insofar as the cause of this disturbance can be ascertained.

Hemolytic jaundice due to hookworm disease or intestinal worms may be quickly cured by the ingestion of anthelmintics.

Malarial hemolytic jaundice should be treated with quinine.

Syphilitic hemolytic jaundice disappears under mercurial treatment.

On the other hand, the congenital forms of hemolytic jaundice, though frequently of syphilitic origin, are not improved by mercury.

Aside from the etiologic treatment, the treatment should be that appropriate in all the anemias.

GENERAL HYGIENE.—Life in the country, physical rest in the open air, and tonic feeding.

IRON OR ARSENIC.—(See Part I, sections on *Iron* and *Arsenic*.)

℞ Ferri reducti,
Rhei āā 0.1 gram (gr. iss).
Pone in caps. amyl. No. i.

This cachet is to be immediately followed by the taking of 40 to 50 drops of dilute phosphoric acid in a glassful of water to promote dissolution of the iron.

Or, 10 to 20 drops of the solution of peptonate of iron [*Liquor ferri peptonati*, N. F.] may be taken at each meal.

Fowler's solution may be given in doses of 5 to 20 drops a day.

TO STIMULATE HEMATOPOIESIS, 50 to 100 grams (1½ to 3 ounces) of calves' bone marrow may be given daily in sandwiches.

Some observers believe that the hemolytic disturbance is dependent upon splenic enlargement, and advocate treatment by *splnectomy*. But this operation is attended with risk (10 per cent. mortality) and should be reserved for the most serious cases. [W. J. Mayo has, however, splenectomized 37 cases with but 1 death, and is strongly impressed with the results in hemolytic jaundice of long standing.—Tr.]

It is better to treat the spleen by non-surgical measures, such as X-ray treatment of the splenic region.

**JOINT PAINS.
ARTHRALGIA.
RHEUMATISM.**

[*ῥευματισμός, from ῥεῦμα, flux.*
Rheumatism.]

The treatment of **joint pains** is necessarily taken up in various sections of this work (acute rheumatism, gout, gonorrheal arthritis, etc.). Nevertheless it seems strongly advisable to condense into a brief summary the general principles governing the treatment of joint diseases. (The indications for such treatment have already been presented in the companion work, "*Clinical Diagnosis*," in which the diagnosis of joint disorders is discussed.)

The required (condensed) information will be given here partly in the form of tables.

Thermal and Mineral Water Treatment of Chronic Joint Affections.

—The mineral waters exert various, complex influences, among the most important of which is the factor of temperature. The *thermal waters* are therefore used in these cases.

In some forms of chronic rheumatism the *sodium sulphide* waters are employed. These waters are stimulating, and are not suitable for nervous individuals with lesions of the internal organs.

The *calcium sulphide* waters, including those in which *chlorides* are associated with the sulphur component, are resolvent, but stimulating, and are contraindicated in cases with painful, hyperemic exacerbations.

At some of the resorts where these waters are used, the effect of the baths is supplemented by massage and mechanotherapy, *e.g.*, the douche-massage administered at Aix-les-Bains, France.

The *sodium chloride* waters are credited with activating metabolism and toning up the whole system. Definitely chronic cases may be sent to such resorts, but no patients with arteriosclerosis or major nervous conditions should be included among them. On the other hand, the lymphatic type of case, subjects with sluggish metabolism, rheumatic patients with a doughy condition about the joints and cases of multiple deforming arthritis are the ones to which these waters are best adapted.

The *chloride, sodium bicarbonate and arsenic* waters may prove useful in cases that require to be toned up and decongested.

The numerous *simple thermal* or *indifferent* waters, some of which exhibit a *radioactive* property, are suitable for neurotic, excitable, chronic rheumatic cases, and in women, especially if they have utero-ovarian disturbances in addition, and during the period of the menopause, when many cases of joint disturbance begin or grow worse.

Lastly, some of the *mud baths* give very good results. At times the mud is used in the form of poultices. The mud treatments tend, however, to induce congestion and should never be prescribed, at least in the form of baths, in old persons or other individuals whose heart and vessels are in poor condition.

* * *

Following are a few typical plans of treatment for joint cases:

Acute Rheumatism of Intermediate Severity without Internal Complications in an Adult.—1. Careful wrapping of the affected joints in cotton, with complete immobilization.

2. R Sodii salicylatis 10-16 grams (3iiss-iv);
 Sodii bicarbonatis 8 grams (3ij);
 Syrupi aurantii amari 75 c.c. (f3iiss);
 Aquæ destillatæ 165 c.c. (f3vss).

M. Sig.: One tablespoonful every three hours (eight doses a day), preferably in a half-glassful of Vichy water.

a. The dose should be reduced in the event of deficient kidney action (ferric chloride test, urinary output) or of a tendency to toxic symptoms (dizziness, vomiting, etc.).

b. Otherwise the dosage should be maintained until marked relief of the pain and fever has resulted, after which the preparation should be continued in decreasing doses.

c. In the event of gastric intolerance, external application of saliceral (monosalicylic ester of glycerin) and internal administration of antipyrin may be substituted. The former drug is used in a 20 per cent. liniment, of which one tablespoonful is placed on cotton and wrapped about the joint twice daily, covered with oiled silk.

3. On the *first day* the patient should be purged with *citrate of magnesia* and given nothing by mouth except plenty of *water* or simple infusions.

On the succeeding days:

Milk diet (milk, tea, coffee, tapioca, vermicelli with hot or cold milk, with or without sugar and with or without addition of Vichy water). Milk to be taken in 300 to 400 c.c. (10 to 13 ounces) amounts *every three hours*—six times a day—making a total amount of 2 to 2½ liters (quarts).

In the intervals, pure spring water or simple infusions (triticum, cherry stems, corn silk, etc.).

Milk sugar *ad libitum* by the teaspoonful in the milk and infusions.

NOTE.—The urine should be collected in a graduated receptacle, and a chart of the urinary output prepared as carefully as that of the temperature.

Chief factors to be watched:

Temperature; pulse; urinary output; heart, and pleura.

Severe Generalized Acute Rheumatism Previous to Any Definite Cardiac Involvement.—Treatment as in the preceding case, and in addition:

1. Daily injection of 10 c.c. ($2\frac{1}{2}$ fluidrams) of *electrargol*, or daily inunction for twenty minutes with 3 grams (45 grains) of 15 per cent. colloidal silver ointment.

2. Apply *three or four wet cups* over the precordium three or four days in succession.

Acute Rheumatism with Incipient Endo-pericarditis.—Treatment as in the first case, with the salicylate formula modified thus:

℞ Sodii salicylatis	16	grams (℥ss);
Sparteinae sulphatis	0.2	gram (gr. iij);
Spiritus vini vitis	40	c.c. (℥3x);
Mucilaginis acaciae	20	c.c. (℥3v);
Syrupi aurantii florum	30	c.c. (℥3j);
Aquae destillatae	120	c.c. (℥3iv).

M. Sig.: Six tablespoonfuls in the twenty-four hours.

And in addition:

1. An intravenous injection of 5 to 10 c.c. ($1\frac{1}{4}$ to $2\frac{1}{2}$ fluidrams) of *electrargol*.

2. Daily precordial *wet cups* followed by an *ice-bag*.

3. Injection of Wright's vaccine (?) or of antistreptococcus serum.

Rheumatic Endo-pericarditis in the Afebrile Period (Beginning Mitral Fibrosis).

1. Alternate every ten days the two following formulas:

(a) ℞ Sparteinae sulphatis	0.5	gram (gr. viiss);
Sodii iodidi	8	grams (℥ij);
Syrupi aurantii florum	60	c.c. (℥3ij);
Aquae destillatae	140	c.c. (℥3ivss).

M. Sig.: One dessertspoonful morning and evening.

(b) ℞ Sodii arsenatis	0.1	gram (gr. iss);
Aquae destillatae	100	c.c. (℥3iiiss).

S. Sig.: One teaspoonful morning and evening.

2. The following combination to be painted over the precordium daily:

R Tincturæ digitalis	10 c.c. (f3iiss);
Tincturæ iodi	100 c.c. (f3iij).

M. Sig.: For external use.

Gonorrheal Rheumatism.

I. ACUTE SEROUS GONORRHEAL ARTHRITIS.—A. *Treatment of the primary urethritis* (see Part IV: *Venereal Diseases*).

B. *Local treatment of the joint:*

a. Careful *immobilization* of the affected joint on a padded posterior (gutter) splint, with gentle compression.

b. One tablespoonful of the following liniment to be applied over the diseased joint:

R Acidi salicylici	10 grams (3iiss);
Olei terebinthinæ	10 c.c. (f3iiss);
Adipis	10 grams (3iiss);
Adipis lanæ hydrosi	80 grams (3iiss).

M. Sig.: For external use.

Cotton and oiled silk should be applied over the liniment.

c. In the event of *severe pain*, *ice poultices* (pieces of ice in a cold linseed poultice) should be resorted to; if absolutely necessary, morphine.

C. *Internal treatment:*

a. R Sodii salicylatis	20 grams (3v);
Spiritus vini vitis	40 c.c. (f3x);
Syrupi aurantii florum	90 c.c. (f3iij);
Aquæ destillatæ	q. s. ad 300 c.c. (f3x).

M. Sig.: Four tablespoonfuls a day with a cupful of some simple diuretic infusion (barley, couch grass, etc.).

b. Methylene blue pills each containing 0.05 gram ($\frac{3}{4}$ grain); two to four pills a day.

c. Milk diet and copious ingestion of fluids.

D. *Specific treatment:*

In severe or refractory cases the following procedures may be tried:

a. An injection of 20 c.c. of *antimeningococcus serum*.

b. *Repeated injections of gonococcus stock vaccine in ascending dosage*.

II. GONORRHEAL ARTHRITIS WITH ACTUAL OR THREATENED SUPPURATION.—A. *Treatment of the primary urethritis*.

B. *Local treatment*.—*Bier's hyperemia* and *local applications of mercurial ointment with belladonna* [50 per cent. mercury and $13\frac{1}{3}$ per cent. extract of belladonna] should be tried.

C. *Specific treatment*.—*Antimeningococcus serum* or *gonococcus stock vaccine*.

ACUTE NON-SUPPURATIVE JOINT DISTURBANCES.

ACUTE RHEUMATISM (Rheumatic Fever).	SPECIFIC TREATMENT. <i>Sodium salicylate.</i> <i>Acetylsalicylic acid.</i>	GENERAL NON-SPECIFIC ANTI-BACTERIAL LEU- KOCYTOSIC TREATMENT.	SEDATIVE AND LOCAL TREATMENTS.
ACUTE GOUTY ATTACKS.	<i>Colchicum.</i>	1. Colloidal preparations. Ointment rubbed in locally. Intramuscular injections. Intravenous injections. 2. Autoserotherapy.	Hypnotic analgesics of the type of morphine or anti- pyrin where pain is severe. Careful temporary immobiliza- tion of the painful joint.
INFECTIOUS JOINT DISTURBANCES.	<i>Vaccines (stock or autogenous).</i> <i>Serum treatment (?)</i> . <i>Intra-articular.</i> <i>Antigonococcic</i> { <i>Intramuscular.</i> <i>Intravenous.</i> <i>Antimeningococcic.</i>	3. Intravenous injections of foreign proteins, bacterial or other (typhoid vaccine, peptone, milk). 4. Local applications: Mercu- rial ointment with belladonna.	Local application of sedative preparations: Opium: Laudanum. Belladonna ointment. Salicylates: Methyl salicyl- ate.
Gonorrheal.	<i>Antituberculosis serum treatment</i> <i>(?)</i> . <i>Vaccine therapy (?)</i> .	5. Injections of salts of ra- dium or of mesothorium (?).	Local counterirritation: Tincture of iodine; cauteriza- tions. Blistering, followed by aseptic dressing. Ice-bags.
Tuberculous.	<i>Specific treatment.</i> <i>Mercurial inunctions.</i>	TREATMENT OF THE CAUSAL BACTERIAL FOCUS.	Galvanic current: Salicyl ionization.
Syphilitic.	<i>Antistreptococcic serum.</i> <i>Bacterial vaccines (streptococcus,</i> <i>staphylococcus, mixed).</i>	Tonsillar infections always to be thought of and treated. Gonorrhea and other infections of the urinary tract to be given careful treatment. Metritis, vaginitis or puerperal infections to be treated.	Thermotherapy: Hot air douche. Hot air and light baths. Hot sand-bags. Vapor baths; fumigation. Bier's hyperemia. Radio-active mud treatment.
Miscellaneous.	Post-scarlatinal. Post-influenzal. Post-typhoid. Post-tonsillitic. Post-puerperal.		

CHRONIC JOINT DISTURBANCES.

<p>SEQUELÆ OF JOINT INVOLVEMENTS in Rheumatic Fever or Following Infectious Diseases.</p>	<p>SPECIFIC TREATMENT. <i>Much less certain than in the acute forms.</i> Sodium salicylate and acetylsalicylic acid (intermittently). Bacterial vaccines (efficacy very questionable). <i>Antistreptococic or antimeningococic serum.</i></p>	<p>GENERAL NON-SPECIFIC MEASURES. According to the case and of whatever nature the joint disturbance may be: <i>Analgesics.</i> Antirheumatic: Type drug, acetylsalicylic acid. Antineuralgic: Type drug, antipyrin. <i>Urinary antiseptics and diuretics.</i> Methenamine and its derivatives. Uricosolytic drugs: Type drugs, piperazin, lithium salts; diuretic mineral waters, such as Evian and Vittel. <i>Alteratives.</i> Iodine and the iodides. Arsenic and the arsenicals. Thiosinamin (absorbing fibrous tissue?). Alkalies (sodium bicarbonate) or acids (phosphoric acid). <i>Endocrin remedies.</i> Thyroid, ovary, hypophysis. <i>Chronic foci of infection should be sought with care and eliminated.</i> An especial search should be made for pharyngeal and genitourinary infections and for tuberculous foci. Antisepsis of the digestive tract, purgation, and diet, with curdled milk and lactic ferments.</p>	<p>LOCAL AND PHYSICAL MEASURES. Local counterirritation: Applications of iodine, belladonna, salicyl or mercurial preparations; blistering. Thermotherapy. Massage. Mobilization. Mechanotherapy. Electrotherapy. Salicyl ionization. High frequency effluve. Mud baths. Sulphur baths. Radio-active applications. Radium. <i>Surgical measures:</i> Arthrotomy, synovectomy, straightening operations, section of tendons.</p>
<p>CHRONIC JOINT DISTURBANCES. Gouty.</p>	<p><i>Colchicum and uricolytic agents, intermittently.</i></p>		
<p>Tuberculous.</p>	<p><i>Serum and vaccine treatments (results very uncertain).</i></p>		
<p>Syphilitic.</p>	<p><i>Intermittent general specific treatment.</i> <i>Locally: Mercurial ointment or plaster.</i></p>		
<p>CHRONIC RHEUMATISM. (a) Wandering. (b) Localized (Heberden type). (c) Progressive deforming.</p>	<p><i>The nature of this form of rheumatism being as yet largely unknown, there is no specific treatment.</i> <i>Treatment with alkalies (sodium bicarbonate), acids (phosphoric acid) and colchicum may, however, be looked upon as specific if high or low acidity of the body fluids or gout is clearly the cause of the condition.</i> <i>Aside from these drugs, a diet low in calcium and purins seems in a measure to meet an almost specific pathogenetic indication. Syphilis should always be looked for and treated.</i></p>		

In established suppurative arthritis: *Free arthrotomy with joint irrigation and drainage.*

III. GONORRHEAL ARTHRITIS WITH TENDENCY TO ANKYLOSIS.—A. *Local treatment.*—Systematic treatments by:

a. *Salicyl ionization* (negative pole over the affected joint; current of 40 to 80 milliamperes; duration, $\frac{1}{2}$ to 1 hour), followed by:

b. *Massage* (effleurage, pétrissage), followed by:

c. *Progressive mobilization*, either manually or by mechanical means:

B. *As secondary measures, in the intervals:*

a. *Faradic treatment* of the muscles about the affected joint.

b. *Hot sand baths* or light and heat baths, or *sulphur baths.*

c. *Every evening:* Rubbing with iodine ointment.

C. *General treatment.*

a.	Sodii arsenatis	0.1 gram	(gr. iss);
	Potassii iodidi	5 grams	(gr. lxxv);
	Aquæ destillatæ	300 c.c.	(f3x).

M. Sig.: One tablespoonful with the morning and noon meals.

b. Later, mud baths or thermal water cure.

Tuberculous Rheumatism.—From the standpoint of treatment, tuberculous pseudo-rheumatism, acute and subacute, appears to present exactly the same indications as those already described for the infectious forms of pseudo-rheumatism (exemplified in the foregoing account of the treatment of gonorrheal rheumatism).

Treatment of the cause: This is the general hygienic-dietetic and drug treatment of tuberculosis, which will be found described in the section on *Pulmonary Tuberculosis.*

Local and general treatment of the joint conditions: This is identical, in its main features, with that above described for gonorrheal rheumatism.

Serum Joint Disease.—Jousset, who has made a special study of this form of joint disturbance, ascribes it, in view of its late appearance (12 to 14 days), at the very time when the serum is disappearing from the system, to some indirect effect of the serum dependent upon pronounced changes that have occurred in the tissue fluids. The considerable discharge of uric acid which takes place, together with a rise in the ratio of purins to phosphorus, leads him to compare the condition to the acute gouty attack—a comparison also warranted by the etiologic conditions under which the serum joint disturbance appears. Actually, the best plan of treatment for the condition is that used in gout, *viz.*, colchicum and salicylates. It is well to be very cautious, however, in applying this treatment, and to keep the heart very carefully under observation.

LEUKOPLAKIA.

[λευκός, *white* ;
πλάξ, *patch, surface*.]

By P. RAVAUT, M.D.

Leukoplakia is a hyperkeratosis of the mucous membranes. It occurs most frequently at the commissures of the mouth and on the tongue. It is almost always, if not exclusively, of syphilitic origin and is made considerably worse by the use of tobacco and an unhealthy condition of the mouth.

The principal indications are, therefore:

1. *Complete cessation of the use of tobacco.*
2. *Stringent hygiene of the mouth.*

(a) Washing of the mouth after each meal with a half-glassful of water to which has been added a teaspoonful of hydrogen peroxide solution or some alkaline solution.

(b) Teeth or dental plates to be kept strictly clean.

(c) Occasional topical applications of, *e.g.*:

℞ Cupri sulphatis	1 gram (gr. xv);
Aquæ	5 c.c. (℥ lxxx);
Glycerini	4 c.c. (f3j).

M. Sig.: To be applied sparingly once a day.

3. *Antisyphilitic treatment.*

This sometimes yields excellent results in dispelling the infiltration of the mucosa, arresting the progress of the leukoplakia and perhaps obviating the cancerous transformation always to be feared in these cases. It is often incapable, however, of causing disappearance of the horny condition of the mucous membrane, and its action must, therefore, be assisted by local treatment.

The most active salt is calomel, administered in intramuscular injections, in conjunction with intravenous injections of neoarsphenamin.

4. *Local treatment.*

This should be resorted to only after institution of the general treatment, and in particular the antisyphilitic treatment.

The local treatment has for its purpose to cause the horny layer to drop off and be replaced by cicatricial tissue. In leukoplakia of the buccal mucosa, use may be made of:

(a) The thermocautery: The flat blade should be lightly applied over the diseased area, which will become raised and drop off a few days later.

(b) Carbon dioxide snow, which has given good results.

(c) Spark treatment by means of the high frequency currents or by diathermy.

All these procedures have for their purpose to coagulate the keratinized superficial layers, which thereupon drop off along an actual plane of cleavage.

With all these measures a rather powerful action can be instituted on the lesions of the oral mucosa; but in the case of the lingual mucous membrane the treatment must be much gentler as the lesions produced remain painful for a long time if the treatment is too severe—probably on account of the sensitiveness of the papillæ.

For the lingual mucosa I prefer the use of the high frequency currents which, properly handled, produce no open wound and bring about detachment of the epidermis in a few days.

If there is the least suspicion of cancerous degeneration, no time should, of course, be lost with these measures, but a piece of tissue removed for examination and intervention with the knife or radium instituted.

LOSS OF WEIGHT.

The *twofold indication to be met*, aside from removal of the cause, in preventing a person from losing weight or in making him regain weight consists in: (1) *Reduction of his bodily expenditures.* (2) *Increasing his intake.*

Reduction of the bodily expenditures is the first thing to be seen to, as one cannot immediately increase the intake. Thus, in the case of a dyspeptic, the first aim must necessarily be to cure the dyspepsia; the physician should therefore confine himself to meeting the first indication by prescribing *rest* as a factor *sine qua non* in recovery.

These patients should be placed at *rest in the recumbent position*, lying on a bed or sofa. In some cases, it is even necessary, especially in women, to provide a nurse charged with the duty of keeping them under watch and preventing their walking about constantly in their apartments, as they are likely to do.

It is then always advisable, however, to have the patient carry out systematic exercises in dorsal decubitus in order to activate the circulation—always reduced in these cases. Very soon, accurately regulated walks should be allowed; bodily motion is necessary for proper circulation and nutrition.

Next the *appetite* must be *reawakened*. In simple dyspeptic conditions, this is readily effected with the bitter tonics, strychnine, and alkaline waters taken one-half hour before meals.

In anorexic subjects with toxemia, *e.g.*, in tuberculous cases, an almost constant supply of fresh air is the best appetizer. In such a case, life in the country should be advised, preferably at a high elevation. *Inhalations* and *injections of oxygen* are of service in some cases.

In hysterical cases it is necessary to resort to *isolation* in a suitable institution or to threaten the patients with gavage. If their anorexia is the result of an inhibition of the digestive juices, diversions, travelling or a high elevation may be sufficient to overcome it.

As accessory procedures, **hydrotherapy** may be employed in the form of *very brief douches*, never pushed to the point of fatigue, and *warm baths*; care should be taken not to give prolonged hot baths, as they result in loss of weight.

What **foods** should be recommended to cause a person to gain weight?

In the first place, one should not get the idea that he can be made to gain weight by being given a large amount of fats. The fats

should enter into the diet only in a definite proportion necessary for proper functioning of the alimentary tract, which should always be fostered when one desires to keep the individual in good general health. This proportion may be laid down thus:

Proteins	2 parts.
Carbohydrates	7 parts.
Fats	1 part.

The relative amount of one or the other of these classes of foods can be reduced or increased according to the individual tolerance in different patients. Generally, dyspeptic cases with hypopepsia or biliary and pancreatic insufficiency do not take the fats well; this difficulty can be overcome by supplying an increased amount of the starchy carbohydrates, flours and pastes, and especially of the sugars, which are well digested and increase the fats in the system. Sugar is one of the most useful substances in such cases. In patients with hyperchlorhydria, some fatty foods, especially cream, are well borne; starches, on the other hand, are poorly borne; sugar is again an available resource for these patients.

It is well to have the protein foods taken in a state of fine subdivision and to use ground or powdered meats. The peptones and albumoses, good preparations of which are now available, may be employed to good advantage.

The fats should be given in the saponified form. Oil emulsions are very useful.

Milk should, in most cases, be used only as a supplementary food, for to take it exclusively would necessitate the ingestion of several liters of it a day. In the cases of dyspepsia associated with hyperchlorhydria or ulcer, however, better results are obtained with the milk diet than with any other. Such a diet also exerts a favorable influence in some neurotics with gastric hyperesthesia.

Among the intestinal conditions, due distinctions must be drawn: In colitis, including the mucomembranous form, milk is contraindicated, whereas pastes (macaroni, etc.), flours, kephyr and yoghurt, with a moderate amount of sugar and proteins, should form the foundation of the diet. In inflammations of the small intestine, including the enteritis of the tropics and tuberculous enteritis, milk, ground raw meat, and later eggs yield the best results. None of these diets, of course, will bring about a gain in weight unless the foods taken are perfectly digested.

A product now being manufactured is *glycogen*, which may be given in capsules or pills, in addition to the other foods, in feeding-up cures.

Again, there are certain **drugs** which possess an unquestionable, though subsidiary, influence in the treatment of loss of weight. In the front rank of these stands *arsenic*. This drug should be regarded as having actual power to modify tissue metabolism and the glandular functions which govern the processes of assimilation or fat deposition. In these cases it is advantageous to employ the hypodermic route, injections of sodium cacodylate or arrhenal (sodium methylarsenate) being given daily or on alternate days in series of ten or fifteen injections, with intervals of twenty days between series; the general condition of the patients should be kept under observation. If the stomach and bowel will tolerate them, preparations of arsenic should be given by the mouth, as well as mineral waters such as that of La Bourboule, which proves very useful in some tuberculous cases.

Valerian is serviceable in lowering tissue interchanges through its action on the nervous system. It may be used, therefore, in neurotics, neurasthenics and psychasthenics in the form of boluses, pills and enemas.

The *glycerophosphates* and strychnine are drugs which act indirectly. Combination of these agents with sodium cacodylate is useful in neurasthenia with loss of weight.

Systematic use of *pepsin* and of *pancreatin* cannot but exert a favorable influence through improvement of the processes of digestion and assimilation.

Injections of 2 to 5 c.c. (30 to 80 minims) of *camphor in oil* have frequently seemed of service in my experience.

In tuberculous cases, I have given hypodermic injections of 50 to 200 c.c. ($1\frac{1}{3}$ to $6\frac{2}{3}$ ounces) of a 1 per cent. solution of *creosote in oil* with some success.

Finally, in some cases the *psychotherapeutic effect* of isolation of the patient away from his usual surroundings—with removal from the fatiguing pursuits or enervating pleasures that have undermined his general health, in a special institution in a pleasant, somewhat elevated locality—constitutes the most essential factor in the treatment of loss of weight.

There can be no doubt, indeed, that this psychic factor plays an extremely important rôle in the majority of cases (aside from the diseases producing cachexia, such as tuberculosis, cancer, diabetes in the hectic stage, etc.). The depressive psychoneuroses with low blood-pressure and loss of weight recover only through improvement of the tone of the nervous system and circulation, upon which the entire state of body nutrition so obviously depends. How many were the cases of this sort which we saw brought to recovery only by victory and peace in 1918!

LOW BLOOD-PRESSURE.

Aside from the temporary drops in blood-pressure which occur in fainting spells, **low blood-pressure** occurs in four groups of cases which present rather distinct therapeutic indications:

Hyperacute low blood-pressure in shock and severe hemorrhage.

Acute low blood-pressure in infections and cachectic states.

Subacute low blood-pressure in convalescence, the anemias, tuberculous conditions and neurasthenia.

Chronic low blood-pressure in constitutional hyposphyxia.

I. HYPERACUTE LOW BLOOD-PRESSURE IN SHOCK AND SEVERE HEMORRHAGE.—Opportunities for the study of the morbid conditions known as “shock” were only too plentiful during the World War. A considerable accumulation of observations resulted, and, as is often the case under such conditions, a certain amount of confusion. Lacking sufficient space to discuss this question *in extenso*, I shall merely attempt to condense in a clear manner the chief facts learned.

By the term “shock” is commonly meant a morbid condition developing rapidly and characterized especially by extreme weakness, a small, frequent, thready pulse, with a considerable reduction of blood-pressure, low body temperature, striking pallor, mental apathy, torpor, at least partial insensibility, and irregular respiration.

From the clinical standpoint, shock is met with mainly in consequence of a severe hemorrhage (hemorrhagic shock), a severe physical or mental commotion (nervous shock), a severe intoxication (toxemic shock in extensive tissue necrosis), anaphylaxis (anaphylactic shock) and anesthesia (anesthetic shock).

Fatigue and cold are predisposing causes. As for the much discussed intimate nature of shock, late investigations, in particular those of Roger, seem to point to nervous inhibition as the predominating factor. Many of the manifestations of shock—anaphylactic shock in particular—recall in all respects paralysis of the vagus nerve (accelerated pulse and respiration, drop of blood-pressure, lowered temperature, copious sweating, etc.). As for the unquestionable disturbances relating to the blood, it should be remembered that these

disturbances may be induced by any substance (peptone, serum, nuclein, etc.) which is capable of exerting a thromboplastic effect, upsetting the colloid balance of the blood, increasing its coagulability and bringing about its flocculation. These disturbances are probably antecedent and underlying causes of coagulation in the walls of the vessels, with resulting paresis of these walls and vaso-dilatation, leading, in turn, to low blood-pressure and paresis of the medullary centers, the vagal centers in particular.

The most widely applicable **treatment** of shock may, it seems, be condensed as follows:

1. All measures should be taken *to prevent cooling and to warm up the body*: All exposure to cold should be avoided and the patient given hot drinks and stimulants (sugar, tincture of cinnamon, tincture of nux vomica, brandy), surrounded with hot-water bottles or bags, and carefully covered.

2. The secondary effects of the low pressure should be combatted by all possible means that will tend to remedy the low pressure, and without too much delay, for if the pressure has remained too long below the critical level of 80 to 90 mm. Hg, no procedure known will be capable of restoring the vaso-constrictor center to activity.

If the customary procedures, consisting of external heat, hot stimulating drinks and injections of strychnine, camphor in oil, or physiologic salt solution do not result within half an hour in a rise of blood-pressure of at least 30 mm., with material improvement in the general condition, there should be instituted without delay:

- (a) *Blood transfusion*, if a donor is available (see *Transfusion*), or

- (b) *Injection of artificial serums to which a colloidal condition and a sufficient viscosity have been imparted by the addition of glucose or of gum acacia*. In this connection an important feature is to be kept in mind. Hypodermic or intravenous injections of exclusively saline solutions produce no effect, or act only evanescently, on the blood-pressure. Such solutions, rapidly eliminated through the kidneys, are not retained by the blood, and do not increase its volume. The factor of viscosity of the fluid injected seems to be of prime importance whenever the object sought is to increase the total volume of the blood. This would be a good subject for further study. As a matter of fact, Fleig, Bayliss, Hogan and Richet were all led by their experimental results to recommend the use of saline solutions with addition of glucose, acacia or gelatin, the presence of which insures a much more prolonged action (see *Artificial Serums*). The purely saline solutions give poor results.

- (a) Lactose or glucose 5 grams (gr. lxxv);
 NaCl solution (0.7 per cent.) 1 liter (Oij).
 (RICHEL.)

To be sterilized.

- (b) Physiologic salt solution with addition of 5 or 10 per cent.
 of gum acacia. (BAYLISS.)

These solutions might be administered in the bowel by the Murphy drop method, but as the cases in which they are to be given are nearly always emergency cases, the *hypodermic* and *intravenous* routes are preferable, at least for the initial administration of $\frac{1}{2}$ to 1 liter of solution, after which the measure could be continued by enteroclysis.

* * *

As useful adjuncts, mention may be made of:

1. Injections of *strychnine*, 0.002 to 0.005 gram ($\frac{1}{30}$ to $\frac{1}{12}$ grain) at a dose, repeated every six hours.

Injections of *camphor in oil*, *ad libitum*.

2. Administration of *adrenalin*, 0.001 to 0.002 gram ($\frac{1}{60}$ to $\frac{1}{30}$ grain), either hypodermically, preferably added to the saline or other solution, or by the mouth or rectum; its action is extremely fugacious.

3. Enemas of *coffee with sugar*.

4. Injections of *morphine*, or better of the *total alkaloidal extract of opium* (pantopon), in the event of acute pain.

5. *Elevation of the legs* and the *application of a tight bandage about the abdomen*, to raise the blood-pressure by driving out the blood stagnant in the abdominal veins.

6. *Massage* and *rhythmic percussion of the cardiac region*.

The measures customarily employed in *anesthetic shock* may be recalled: Flagellation of the face and chest, lowering of the head, electric stimulation of the phrenic nerves, and particularly, artificial respiration and rhythmic traction on the tongue.

II. ACUTE LOW BLOOD-PRESSURE OF ACUTE INFECTIONS, such as typhoid fever and influenza.—Under these circumstances recourse should be had especially to *camphor in oil*, *strychnine*, *sparteine*, *adrenalin*, and *hypodermic injections of oxygen gas* and of *saline solution*.

Camphor in oil, 10 per cent., is serviceable as a heart stimulant, harmless, not causing nervous excitement, and which may be given in doses of 2 to 10 cubic centimeters ($\frac{1}{2}$ to $2\frac{1}{2}$ fluidrams).

Sparteine may be serviceably combined with strychnine in these cases, and the following formula may be recommended:

- R Sparteinæ sulphatis 0.1 gram (gr. iss);
 Strychninæ sulphatis 0.01 gram (gr. $\frac{1}{10}$);
 Aquæ destillatæ et sterilisatæ 10 c.c. (f $\frac{3}{4}$ ss).
 M. Sig.: Two or three cubic centimeters (30 to 45 minims) to be injected
 two or three times a day.

Adrenalin, a heart stimulant and vasoconstrictor, acts powerfully in neurocirculatory weakness in infectious toxemia. It should be given by the hypodermic or rectal route to the daily amount of 1 to 3 cubic centimeters (15 to 45 minims) of the 1:1000 solution. It is all the more indicated in that reduction of adrenal secretion seems to exist in these infections attended by low blood-pressure.

Whether it be used by injection or in an *enema*, the adrenalin may appropriately be given in conjunction with small amounts—10 to 50 cubic centimeters (2½ to 10 fluidrams)—of *physiologic salt solution*.

Caffeine is not to be recommended, as it is more of an excitant to the nervous system than a tonic remedy.

Application of cold over the precordium sometimes acts as a powerful cardiovascular stimulant. Its effect must, however, be supervised by careful observation of the frequency and tension of the pulse.

The question of administering *alcohol* in febrile disorders is apt to arouse acrimonious controversies, and it is precisely because they are acrimonious that they are blind, for one must, indeed, be blinded with idealism to deny the obvious stimulating action which toddy, champagne, whiskey, or a cup of coffee containing a little brandy is capable of exerting in adynamia and low blood-pressure.

III. SUBACUTE LOW BLOOD-PRESSURE IN CONVALESCENCE, THE ANEMIAS, TUBERCULOUS CONDITIONS AND NEURASTHENIA.—Here the treatment must be prolonged and systematic. Its chief components should be:

1. A systematic, intelligently planned "*feeding up*" process, adapted to the disease in its existing form (with or without fever, etc.) as well as to the patient and his digestive capacity (dyspeptic or non-dyspeptic).

2. *Open air* treatment, likewise well regulated and not pushed to excess, as anemic cases must not be "burned up."

3. *Physical rest*, suitably interspersed with progressive myotherapy under supervision.

(For the necessary details, see the sections on *Anemia*, *Tuberculosis* and *Neurasthenia*).

4. *Drug treatment*, in which the most characteristic agencies are:
 Arsenic and iron preparations.

Iodotannic and cinchona preparations.

Glycero- and cerealophosphates.

Strychnine, adrenalin.

If need be:

Hypodermic injections of oxygen gas.

Injections of artificial serums, typified by Quinton's solution, Fleig's glycomineral solutions, etc.

5. Cardiac organotherapy: Administration of heart peptone.

The drug treatment should, of course, be adapted to the individual case. Following, as a mere suggestion in this connection, is a plan of drug treatment which I often prescribe in this class of cases:

For ten days in each month:

℞ Strychnine sulphatis	0.05 gram	(gr. $\frac{3}{4}$);
Sodii arsenatis (N. F.)	0.1 gram	(gr. iss);
Sodii glycerophosphatis (N. F.)	10 grams	($\bar{\text{ss}}$);
Extracti cinchonæ	20 grams	($\bar{\text{v}}$);
Spiritus vini vitis	50 c.c.	($\bar{\text{fss}}$);
Glycerini .....q. s. ad 150	c.c.	($\bar{\text{fssv}}$).

Ft. sec. art.

Sig.: One teaspoonful three times a day just before meals in a small amount of beverage.

For the next ten days:

Fresh serum of a bled horse, 10 to 20 c.c. ($2\frac{1}{2}$ to 5 fluidrams) in an enema, by mouth, or by hypodermic injection.

For the last ten days:

1. Adrenalin solution, 1:1000. One cubic centimeter (16 minims) *morning* and *evening* in an enema, or by injection or ingestion, in 10 to 30 cubic centimeters ($2\frac{1}{2}$ to 8 fluidrams) of *Quinton's solution*.

2. ℞ Sodii chloridi,
Magnesii sulphatisāā 0.1 gram (gr. iss);
Calcii phosphatis,
Calcii carbonatisāā 0.4 gram (gr. vj).

Ft. cachet. No. i. Da tal. No. xxx.

Sig.: Three cachets a day with the meals.

IV. HYPOSPHYXIA.—Organotherapeutic and other drug treatment.—In the hypospHYXIC syndromes, the therapeutic indications are clearly established by the pathologic physiology of the disturbance.

1. HypospHYXIA is a circulatory syndrome characterized by an absolutely or relatively low pulse pressure, indicating weak cardiac propulsion and reduced arterial output—and an absolutely or relatively high blood viscosity—indicating venous stasis, anoxemia and slowing of the circulation.

The treatment should therefore be, in the first place, such as will strengthen vascular and cardiac activity, i.e., stimulate the circulation. This stimulation should be effected by physical means as well as by drugs, including organotherapy.

2. Hyposphyxia is accompanied by reduced glandular activity. The pluriglandular insufficiency involves permanently the exocrin digestive glands, and frequently the endocrin glands, more especially the adrenals and the pituitary.

The treatment should therefore be systematically directed to the glandular activities. In a first stage, it should make good the pluriglandular insufficiencies by suitable pluriglandular organotherapy, *i.e.*, temporarily it should be of a substitutional type. It cannot be too strongly stressed, however, that this combined hypercrinic and hypersphyxic treatment will bring about the desired stimulation of function and frequently a return to practically normal function.

The stimulation of the heart and vessels leads, through enhanced circulation, to stimulation of glandular action, which, in turn, reacts on nutrition and circulation, causing them to be stimulated, and so on. The preëxisting vicious circle is interrupted.

The treatment directed to the strengthening of the heart and vessels may and should comprise: 1. Stimulation by drugs. 2. Purely physiologic stimulation through myotherapy. 3. Stimulation by certain special sthenic agents—in particular, hypodermic injections of oxygen gas.

Pharmaceutic stimulation may be procured with very many drugs, complete enumeration of which is unnecessary.

Five remedies have in particular retained my attention. Two of them are vegetable alkaloids, *vis.*, strychnine and sparteine, while three are organotherapeutic products, *vis.*, adrenalin, hypophysin, and desiccated heart extract, peptonized or unpeptonized.

The maximum official doses (Codex) of these drugs may be recalled:

Strychnine: 0.005 gram ($\frac{1}{12}$ grain).

Sparteine: 0.05 gram ($\frac{3}{4}$ grain).

Adrenalin: 0.001 gram ($\frac{1}{60}$ grain).

Hypophysin: 0.001 to 0.002 grain ($\frac{1}{60}$ to $\frac{1}{30}$ grain).

Heart peptone: Not yet recognized; to be prescribed in a powder or elixir in average doses of 5 to 10 grams (75 to 150 grains) a day.

Mention may be made, furthermore, of the fact that injections of strychnine cause a notable increase of adrenalin secretion.

Given separately or together, in continuous combination or in alternation, these five substances seem to me to answer most of the indications as regards raising the blood-pressure. Their administration is subject to numerous variations, according to the kind of clinical condition present.

Physiologic stimulation should be obtained by means of myotherapy or progressive physical training. No proceeding is more useful and even indispensable for a lasting cure. The treatment of cardiac

debility represents, on the whole, merely one instance of the treatment of muscular debility. As Heckel wisely says, it is by fatiguing himself that a person trains himself to undergo fatigue; it is by training his heart to perform steadily progressive work that he will overcome his debility. Cœrtel had already proclaimed this fact; his plan of cardiac treatment by graduated walking exercises over inclined surfaces ("terrain cure") is well known.

That the exercise must be precisely regulated; that the earlier exercises should be conducted under careful medical supervision, with the pulse-rate, respiration, and especially systolic and diastolic pressure determinations as guides; that they should under no circumstances be left in the charge of incompetent persons, particularly dangerous under such conditions, is self-evident. But with these precautions taken, no therapeutic procedure is more easily and accurately adjustable, more elastic, than this one—ranging from passive movements and massage to the moderately strenuous sports (tennis, swimming, bicycle riding, etc.), through the finely graded scale of the simple active movements, Swedish gymnastics, co-ordinated exercises, with all the variations procurable through adjustments of rate and the use of graduated resistance.

Obviously, no single plan of rational training, applicable without distinction to all cases, can be formulated in this connection. In the aggregate, however, my personal procedure follows fairly closely the following plan:

FIRST STAGE: Rubs, massage and passive movements of the muscles of the upper and lower extremities.

SECOND STAGE: Active movements on a flat surface: Elevation of the lower limbs toward the body; flexion of the thighs on the abdomen; raising of the body toward the lower limbs, with interspersed breathing exercises.

THIRD STAGE: Active movements against resistance: With dumb-bells (1 to 2 kilograms), against the resistance of elastic cords (exercises of various kinds), or against physiologic resistance ("resistance exercises").

FOURTH STAGE: Progressive co-ordinated movements: Walking on level ground for increasing periods and at increasing rates; walking on rising ground, stair-climbing, etc., up to jumping the rope—the most violent of the co-ordinated movements.

Special mention should be made of *hypodermic injections of oxygen gas*, the action of which I have personally studied in conjunction with Heckel. Almost constantly we observed slowing and increased power of the heart contractions; a rise of blood-pressure, more especially the

pulse pressure; slowing and increased amplitude of the breathing—all of which had already been observed by our predecessors, Bayeux and Ramond in particular, in asphyxial states and tuberculosis.

The treatment for purposes of **glandular stimulation** should be carried out at the same time. The indication presented by the glandular inactivity should be met in a first stage, as already mentioned, by *glandular substitution*, i.e., by the temporary administration of the deficient endocrin substances. The object in view being the restoration of the functional cycle, this glandular substitution should gradually be reduced or even discontinued, according as, through more active circulation, the glandular secretions become more abundant, and as, through the increased glandular secretion and more active nutritive process, stimulation of the circulation becomes more marked.

The digestive pluriglandular insufficiency being permanent in the cases here under consideration, I regularly order organic remedies and drugs stimulating the digestive functions in the earlier period of the treatment.

My plan of procedure is very simple and may be summarized thus:

A.—ONE-HALF HOUR BEFORE MEALS, the patient, in recumbency, is given $\frac{1}{2}$ to 1 wineglassful of warm Vichy water (Grande-Grille), and twenty minutes later, in a little water, 3 to 5 drops of "Baumé's bitter drops" [a French official preparation, essentially a 20 per cent. tincture of *ignatia*; the corresponding procedure in the United States would be to give 6 to 10 drops of *Tinctura ignatia*, N. F., which is of 10 per cent. strength].

This treatment is prescribed for three purposes:

1. To antagonize the gastric stasis frequently existing in these atonic patients and insure evacuation of the stomach before ingestion of the next meal.

2. To excite or start up the gastric secretion beforehand by the administration of alkali in small doses, in conjunction with a bitter.

3. To reinforce the hypodermic strychnine medication. The drug taken by the mouth should, of course, be taken into account in calculating the daily dosage of strychnine.

B. DURING THE MEALS, administration of a good preparation of *pepsin*: I order preferably either pepsin in an elixir, to be taken in the middle of the meal, or the natural gastric juice.

C.—TWO HOURS AFTER MEALS, along with some warm flavored infusion, I give in combination, *total pancreatic extract* (trypsin, diastase and steapsin) and *duodenal extract*.

The **general pluriglandular insufficiency** should likewise be made good at least temporarily by **suitable organotherapy**.

Intermittent temporary organotherapy, consisting in the use of adrenal and pituitary products, has already been availed of, we have seen, in the hypodermic administration of adrenalin and hypophysin for the purpose of strengthening the heart and vessels. It may be recalled here that the hypodermic and rectal routes are those of choice in pituitary and adrenal organotherapy, and that while the toxicity of adrenalin disappears when it is taken by the mouth, the same is true of the greater part of its physiologic effects.

On the other hand, the rectal route is perfectly effective. Adding to this the fact that the stimulating effect on the smooth muscle of the bowel, characteristic of hypophysin (Houssaye), is sometimes very marked and therapeutically valuable, it will be seen that administration by enema has much to recommend it.

Generally it will be useful to intersperse periods of thyroid and ovarian therapy during the treatment, in alternation, *e.g.*, with periods of adrenal and pituitary therapy. In deciding on the measures to be ordered the physician should, of course, be guided by the type of clinical condition present, the presence or absence of the customary signs of deficient ovarian or thyroid activity, and the manner in which the patient reacts to these remedies.

* * *

This treatment is one of some complexity; this is no less true of the clinical syndrome, which is an obstinate one.

Yet, for practical purposes, the treatment can be rendered relatively simple by systematization, and may be summarized as follows:

- (a) A continuous, permanent treatment.
- (b) An alternating, temporary treatment.
- (c) Various auxiliary measures.

A.—The *continuous, permanent treatment* consists essentially of *progressive training suitable* for the individual in question:

First period: Passive movements of the extremities.

Second period: Active movements performed on a flat surface.

Third period: Active movements against resistance.

Fourth period: Graded co-ordinated movements, in combination with a *correct diet, open air life* and systematic respiratory exercises.

B.—The *alternating, temporary treatment* is made up of the measures taken to strengthen the heart and vessels (by drugs and organ extracts) and by the substitution therapy for pluriglandular insufficiency.

Every ten days, for example, the hypodermic or rectal administration of the agents stimulating the circulation (strychnine, spar-

teine, adrenalin, hypophysin) should be alternated with thyro-ovarian and especially with heart-peptone medication.

For the first few weeks there should be used in addition the digestive stimulant and substitution therapy (Vichy and *ignatia before* meals, pepsin *during* meals, and pancreatin, enterokinase, etc., *after* meals). This part of the treatment should be kept up for a period of varying duration, according to the results obtained.

C.—*Various auxiliary measures* may be of value.

Hypodermic injections of oxygen gas contribute much to getting the treatment started. *Injections of camphor in oil, of saline solution, of diluted sea water or of glucose serum* will frequently prove of signal service.

Iodine and its organic products, as well as arsenic, exert an undeniable effect in some cases.

MIGRAINE.

[ἡμι, *half*; κρανίον, *the skull*. Pain]
in one-half of the head.

BY ANDRÉ LUTIER, M.D.

The sufferer from migraine wishes primarily to be relieved during his attacks; yet very rarely does he consult the physician to this end, for he has long since found, among the countless headache tablets on the market, that which, for him, is the most effective. Nevertheless, the practitioner may usefully advise his patient in this matter, if only to put him on his guard against certain proprietaries which are not always without unpleasant effects and against the abuse of drugs that are always injurious to the stomach.

It is especially in order to obviate the periodic recurrence of migraine that the patient seeks medical advice. Prophylactic treatment between the attacks is, to be sure, of great importance, but its efficacy is very often incomplete, since, while there are cases in which a cause can be found and the migraine definitely cured by combating it, generally migraine is associated with humoral changes, the existence and adequate relief of which have been revealed to us by the labors of Widal and his pupils on anaphylaxis; but these humoral changes and the remedy are, unfortunately, at the present time still surrounded by a veil of mystery and uncertainty.

I. TREATMENT OF THE ATTACK.

Antipyrin (in cachets of 0.5 gram—7½ grains—each; two or three in twenty-four hours) is poorly borne by many susceptible or dyspeptic individuals. It is, furthermore, a depressant, and one which “blocks up the kidneys.” It is well to combine caffeine with it.

Amidopyrin (in cachets of 0.25 to 0.3 gram—4 to 5 grains) is prescribed in smaller doses and is less toxic. It has no untoward influence on the heart and circulation, and, if anything, enhances diuresis. Like antipyrin, it may cause digestive disturbances, but these are less severe.

Acetylsalicylic acid (in cachets of 0.5 gram—7½ grains) is more often well tolerated than the preceding drugs.

Quinine hydrobromide (0.25 gram—4 grains—per cachet).

Combination of these several drugs has much to recommend it and permits of using smaller doses of each. It is well to combine with them a small dose of **caffeine** to correct their depressant action (0.03 to 0.05 gram— $\frac{1}{2}$ to $\frac{3}{4}$ grain—per cachet).

Acetphenetidin should be used with much caution, by reason of the frequent idiosyncratic reactions induced and of its depressant action on the nervous system.

Acetanilide may cause untoward results (cyanosis, collapse).

To these drugs should be added: **Rest, darkness,** and restriction to **water.**

In **ophthalmic migraine** there should be added inhalations of amyl nitrite, tea, coffee, and cold water on the face.

In **ophthalmoplegic migraine** potassium bromide and quinine should be tried, or mercury if syphilis is suspected.

II. TREATMENT BETWEEN THE ATTACKS.

Diet.—Principally a vegetarian diet, with fruit. To be excluded especially are eggs, *chocolate*, game, shell fish, preserves, spices, strong cheeses, and sorrel.

It must be admitted, however, that very often, despite a vegetarian diet followed for a long time, the attacks reappear.

The chief causal factor should be looked for, or, if this cannot be definitely located, the following treatments should be tried in succession:—

Treatment for Hepatic Disorder, which often plays an important rôle: Alkaline medication, *vis.*, a mixture of sodium bicarbonate and sodium sulphate or Rochelle salt, of which one teaspoonful in a glass of warm water is taken each morning for ten days; Vichy or Vals mineral water.

Treatment for Uricemia: Lithium benzoate, piperazin, etc. Spas cures: Vichy, Vittel, Contrexéville, Evian, etc.

Anti-anaphylactic Treatment: Preventive administration, in small doses, of the harmful protein substance or at least of some protein substance, as peptone in the dose of 0.5 gram ($7\frac{1}{2}$ grains) in a cachet, one hour before each meal.

Endocrin Treatment.—Thyroid (0.005 to 0.025 gram— $\frac{1}{2}$ to $\frac{3}{8}$ grain—a day for five days), or ovarian or adrenal (adrenalin) products.

Treatment of Excitement of the Sympathetic: Potassium bromide.

Treatment for Slowed Nutrition: Gymnastic exercises, sports, warm hydrotherapy, massage, rubbings with the horse-hair glove.

Treatment for Digestive Disturbances: A suitable diet, slow eating, frequent laxatives for constipation (liquid petrolatum, castor oil in small doses), and neutralizing powders (bismuth subcarbonate, magnesia).

NERVOUSNESS.

To describe the treatment of **nervousness** in full would involve practically a description of the treatment of diseases of the nervous system, for there are very few of these in which nervousness is not a feature. Consideration of the subject here will be limited, therefore, to the presentation of a few essential facts having an essentially practical bearing.

* * *

As with all the symptoms previously discussed, it is necessary first of all to **look for the specific cause** of the disturbance, if such a cause exists, and to try to overcome it by appropriate measures. In this connection the reader is referred to the corresponding section in "*Clinical Diagnosis*," in which the following conclusions were stated:

"In patients below forty the practitioner should think especially of anemia, latent tuberculosis, syphilis, exophthalmic goiter, sexual excesses, and nutritional disturbances.

"In patients past forty he should think especially of arteriosclerosis, diabetes, the menopause, and general paralysis."

"Both before and after forty years a careful inquiry should be made for psycho-emotive causes, such as overwork, psycho-venereal excesses, and nutritional disturbances.

Obviously, the anemia, syphilis, tuberculosis, exophthalmic goiter, diabetes, nutritional impairment, menopause, arteriosclerosis, etc., should be duly treated; appropriate physical and mental hygiene prescribed; nerve intoxications, as by tea, coffee or alcohol, interdicted, and suitable psychotherapy practised. In short, the known or probable cause of the nervous imbalance should be treated as effectively as possible.

* * *

The different forms of nervousness present varying indications.

Motor nervousness is very frequently of toxic or psycho-emotive origin, or the result of exophthalmic goiter. It is therefore necessary to seek and eliminate *toxic factors* (interdiction of tea, coffee, alcohol, opium, cocaine, etc.), *exophthalmic goiter (q.v.)*, and *psycho-emotive irritability* (appropriate psychotherapy, isolation, mental distractions and travelling).

A number of practical points relating to the treatment of this form of nervous disturbance will be found presented in the section on *Tremor*.

Sedatives and antispasmodic agents are very generally indicated in the treatment of motor nervousness (see Part I: *Sedatives and Antispasmodics*).

FORMULAS OF SEDATIVE AND ANTISPASMODIC PILLS.—Valerian, the bromides, belladonna, hyoscyamus and cannabis are the agents most commonly used in sedative treatment. The so-called "Méglin's pills" represent a time-honored combination:

℞ Zinci oxidi,
Valerianæ,
Hyoscyamiāā 0.05 gram ($\frac{3}{4}$ grain).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: One pill three times a day between meals.

Any action on the part of the zinc oxide, which is almost insoluble, appears to be very problematic, and the dose of hyoscyamus somewhat large, while that of the valerian is rather small. I prefer the following formula:

℞ Extracti cannabis 0.01-0.02 gram (gr. $\frac{1}{10}$ - $\frac{1}{8}$);
Extracti hyoscyami 0.03 gram (gr. ss);
Extracti valerianæ 0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: One pill three times a day, between meals.

The following pills have given excellent results, in my experience, in *nervous crethism with palpitations and insomnia*:

℞ Extracti cannabis 0.01 gram (gr. $\frac{1}{10}$);
Extracti hyoscyami 0.03 gram (gr. ss);
Extracti valerianæ,
Camphoræ monobromatæāā 0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: One pill three times a day, between meals, followed by a little water or infusion.

Trousseau used to prescribe the following pills in *epilepsy, spastic constipation and incontinence of urine*:

℞ Extracti belladonnæ,
Belladonnæ foliorum pulverisāā 0.01 gram (gr. $\frac{1}{10}$).

Ft. pil. No. i. Da tal. No. xxx.

Hydrotherapy in its *sedative forms* (prolonged tepid baths) and its *tonic forms* (progressive hydrotherapy) should be regularly employed in these cases.

General sensory and special sense nervousness, manifested in a general or selective hyperesthesia to external stimuli, constitutes an actual algic, rheumatoid diathesis closely related to "neuroarthritism" and Bouchard's bradytrophic diathesis.

It is a constitutional defect, which is very refractory to all treatment in adults, and which dooms the patient to the habitual use of analgesics (antipyrin, acetphenetidin, amidopyrin, exalgin) and recurrent use of the antirheumatics (acetylsalicylic acid, sodium salicylate, colchicum, etc.).

It is in childhood that the attempt should be made to correct this constitutional vitiation. Le Gendre, after having shown the importance of hygiene of the locomotor apparatus in these cases, has contributed a clear account of the general rules which should govern their treatment, as follows:

"As regards prevention of the arthritic dystrophy and of the metabolic diseases—aside from the instructions concerning diet, upon which much stress has properly been laid in recent contributions, and aside from the hygiene of the nervous system, which has been somewhat neglected—there are, to my mind, other indications that are very important, to wit:

"1. To regulate with the greatest care *the use of the organs of locomotion from early childhood* in all children and especially in the descendants of rheumatic individuals: *Exercise* should be *sufficient*, but *never excessive*, and should in particular be carried out *daily*, and include all the motor structures.

"2. To improve the resistance of these structures to cosmic agencies, especially to cold, by a *methodical, progressive training to withstand cold, through stimulation of the skin functions*: Instead of seeking passive protection against these cosmic influences, it is much better to activate the vasomotor reflexes and skin excretion by dry and alcohol rubs, cold ablutions and a 'hardening' type of hydrotherapy.

"Again, when the rheumatic tendency, *i.e.*, the lowered resistance of the locomotor structures to cosmic influences and endogenous injurious factors, has shown itself, the endeavor should be to *discover* and *correct*, insofar as is possible, any *foci of infection or sources of intoxication* which the body may harbor. These will be discovered through a careful clinical examination of the functions of the digestive tract and the annexed glandular organs, the nasal and pharyngeal cavities, the genital organs and the endocrin glands, and through blood examination and uranalysis. Just as there are rheumatic subjects with uric, lactic or oxalic hyperacidity, there appear to be also some with hypoacidity.

"Sources of intoxication should be eliminated by the best procedures now known; the activity of the emunctories should be enhanced, and the defective chemical state of the body fluids should be as far as possible corrected.

"None of this should be taken as detracting from the use of the measures calculated to allay the rheumatic exacerbations or to influence their local pathologic results—measures of a pharmaceutic, and especially of a physiotherapeutic, nature."

Psychic nervousness.—In this connection a complete study of the neuroses and psychoneuroses would be in order, did space permit.

On the whole, the treatment is suggested by the diagnostic findings.

1. If the psychic disturbance represents a manifestation of some concrete somatic condition, such as syphilis, diabetes, arteriosclerosis, intoxication, etc., the somatic condition should be treated first.

2. If the disturbance is the result of some mental perturbation, as by some intimate source of distress, business or other failure, disappointment, envy, defeated ambition, remorse, scruples, etc., appropriate psychotherapeutic treatment—difficult, deceptive, but absorbing; requiring profound psycho-analysis and the soul of an apostle—should be instituted.

3. Lastly, if the disturbance is constitutional, congenital and inherited, an actual malformation and infirmity of the mind is present. The loss of psychic balance is practically incurable. A species of mental orthopedics, in the form of education of sensibility, judgment and will-power, an onerous and discouraging task—will have to be undertaken. In one case, at least, with the admirable coöperation of a poor martyr of a mother, intelligent and clever, I really think I succeeded in rescuing from the abyss of dementia precox and restoring to comparative health a poor obsessed creature, of the congenitally anxious type (inherited), who was subject to the most impressive crises of phobia with hallucinations and delusions.

If necessary, recourse should be had, of course, to all possible sedative measures, physical and chemical—bromides, hypnotics, analgesics, tonics, etc. But there can be no doubt that in such cases these are merely adjunct, symptomatic measures, though useful and sometimes indispensable ones. No form of hydrotherapy, however rational, and no prescription, however cleverly devised, is here the essential factor; it is psychotherapy, the dietetics or orthopedics of the mind, which stands above all else. It extends outside of the field of therapeutics, and can hardly be the subject of a didactic presentation. It makes demands on the "heart" at least as much as on the "mind," and on "sympathy" far more than on "logic." "Heart" and "sympathy" are felt, can hardly be expressed, and cannot be learned. "The heart has its reasons of which the mind knows nothing."

Visceral and vasomotor nervousness.—Grasset's psychosplanchnic or cerebrovisceral neuropathy—a psychoneurosis involving all of the vago-sympathetic domain—is probably more common than is suspected. It is in a measure the Sahara Desert of diagnosis and therapeutics. Much further exploration will be required before the route to be followed can be described with precision.

There are many different types of it. One of the most clear-cut of these, though complex, is *Graves's disease*, ordinarily combining the *sympathetic neurosis* with *hyperthyroidism*. The therapeutic features relating to this condition will be found in the section on *Exophthalmic Goiter*.

This brings to our notice a feature very often connected with the sympathetic neurosis, *viz.*, *hyperthyroidism*. *Hypercypinephria* is no less frequently coexistent. Consequently it does not seem rational to prescribe thyroid and adrenal products in these cases, as is often done. At the most, these agents might be indicated in very advanced cases in which the stage of exhaustion (sympathetic, thyroid and adrenal) has already set in, the stage of excitement and excessive functioning having run its course.

Rest, sedative hydrotherapeutic measures, and the antispasmodics or calmatives constitute, in a general way, the common therapeutic resources. Two drugs, however, seem worthy of especial emphasis and discussion in this connection, *viz.*, *belladonna* and *extract of cannabis*.

Vago-sympathetic pharmacodynamics is still in the formative stage. The accelerating action of belladonna on the heart certainly seems to be the result of a species of curarizing action on the inhibitory nerves (vagi), which amounts, in this connection, to the same thing as a stimulation of the sympathetic; and from this viewpoint belladonna would seem to be contraindicated. The drug's action, however, is much more complex and intricate than this, and along with other manifestations suggesting sympathetic stimulation (mydriasis), there are converse phenomena, *e.g.*, reduced glandular activity and reduction of spasms. The drug can act very differently in different doses and different individuals, but on the whole, we are not very much better off than in the time of Gubler, who summarized the clinical action of belladonna thus: Enervation, asthenia, adynamia and analgesia, manifested in the last analysis by an unquestionable effect in relieving spasm, which dominates the clinical applications of the drug. This is the effect of belladonna which makes it useful in the cases under discussion.

It should be prescribed either in pills containing 0.01 gram ($\frac{1}{100}$ grain) each, to be taken in ascending amounts of 3 to 8 pills a day;

or in the tincture, in ascending amounts of 50 to 150 drops [not minims] a day, in three doses, until signs of the physiologic limit appear; or, as Cazamian recommends in seasickness, by hypodermic injection of 0.00025 to 0.00033 gram ($\frac{1}{260}$ to $\frac{1}{195}$ grain) of atropine one to three times a day, with due testing of the sensitiveness of the patient to the drug.

While I cannot specify precise indications for it, cannabis has often given most gratifying results, in my experience, in sympatheticotonia with reflex nausea. It may be combined with other sedative and analgesic drugs, as in the following formulas:

℞ Extracti cannabis,
Acetphenetidini,
Acetanilidiāā 0.05 gram (gr. $\frac{3}{4}$).

Ft. pil. No. i. Da tal. No. xxx.
Sig.: Two or three pills a day.

℞ Extracti cannabis,
Camphoræ monobromatæ,
Extracti hyoscyami,
Extracti valerianæāā 0.05 gram (gr. $\frac{3}{4}$).

Ft. pil. No. i. Da tal. No. xxx.
Sig.: Two or three pills a day.

Obviously, an underlying local cause of the neurosis should be looked for and eliminated if possible, *e.g.*, hernia, chronic appendicitis, peritoneal adhesions, metritis, etc.

Here again, psychotherapy should be brought into requisition against the cenesthetic obsessions and haunting phobias of these anxious and obsessed neuropaths. As always, much tact and psychologic insight, skill, authority, forcefulness and diplomacy must be exercised in these cases.

* * *

The **anxiety neurosis** possesses many neuro-sympathetic root-connections, if, indeed, it does not itself constitute merely a variety of visceral and vasomotor nervousness. Yet, very often the nerve-tonics and nerve-stimulants—strychnine, glycerophosphates, phosphoric acid, arsenic compounds, injections of physiologic salt solution or isotonic sea water, and oxygen—are serviceable in these cases in meeting their customary indications in depressed subjects with low blood-pressure.

* * *

The clinical aspects of the neuroses, with their markedly individual and shifting nature, do not lend themselves well to a precise, system-

A Plan of Therapeutic Action in Neurotonic Conditions.

There is no organ which may not become the seat of hyperemia or vasomotor ischemia with all the naturally consequent disturbances of function.

Treatment by direct action on the organ is ineffectual.

Indirect treatment through the nervous distribution, vascular supply and body fluids sometimes acts very favorably.

HYGIENIC MEASURES IN THE TREATMENT.

Systematic and rational regulation of the patient's mode of life in all its expressions.

Diet.—Ample, easily digested, with abstention from stimulants in the "hyper" cases.

Myotherapy.—Systematic exercise; physical training, sports.

Hydrotherapy.—Appropriate measures, according to mode of reaction of the patient.

Emotional training (active treatment) in childhood. Sports. *Development of the will-power.* Emotions to be excluded (passive treatment) in the incurable adult case.

MEDICAL TREATMENT PROPER.

1. **Frequency of congenital syphilis.**—Always to be kept in mind. Therapeutic test.
2. (a) **Strychnine** in large doses: Selective treatment for neuro-vascular pareses.
 - (b) *Atropine and belladonna*: Depress vagal terminals (bronchial spasm, intestinal spasm, etc.).
 - (c) *Adrenalin*: Stimulant to sympathetic system (vagotonia).
 - (d) *Endocrin products*: Useful in conjoint endocrin treatments.
 - (e) *Sedatives, analgesics and hypnotics*: Admirable symptomatic remedies, depressing the sympathetic.
3. **Miscellaneous semi-empiric procedures.**
 - (a) Oculo-cardiac compression.
 - (b) Massage of the vagus, neck or solar plexus.
 - (c) Surgical operations (sympathectomies).
 - (1) Angina pectoris.
 - (2) Graves's disease.
 - (3) Raynaud's disease.
 - (d) *Miscellaneous electric treatments*:
 - Ionization.
 - Various rhythmic currents.
 - High frequency.

PROBABLE FUTURE DEVELOPMENTS.

1. Positive knowledge of a stable condition of the body fluids and of sympathetic conductivity.
2. Knowledge of the formation, accumulation and distribution of biologic energy.
3. Neuropsychic energy—certainly one of the forms of energy.
4. Positive knowledge of the biologic relationships between the ponderable and imponderable components.

atic consideration; hence this short review has necessarily had more of the nature of suggestion than of a demonstration. Whether one be dealing with the circulatory, the respiratory or the digestive disorders, or even with the nervous diseases, this question of nervous-

ness, of the neuroses and of the psychoneuroses will force itself upon him incessantly and necessitate many repetitions. No question has a more general bearing or stands higher in clinical medicine and in therapeutics. None demands in greater measure the combination of those three master qualities of the clinician:

Clinical competence, which enables the observer to detect the faults of structure that lead to neuropathic disorders.

Common sense, which elaborates the disturbances observed into a rational whole.

Sympathy and *personal authority*, clearing the path for profound psychoanalysis and curative suggestion, which cannot be condensed into any system.

NEURALGIA.

[νεῦρον, *nerve*; ἄλγος, *pain*.]

The treatment of **neuralgia** almost or quite merges with that of pain, for of all the causes of pain, neuralgia is certainly the most frequent. **Apart from the causal, primary, essential treatment**, involving the amenability of rheumatic neuralgia to sodium salicylate, of neuralgia of syphilitic origin to antisyphilitic treatment, of neuralgia of malarial origin to quinine and arsenic, of neuralgia of dental origin to local treatment, etc., **there is a symptomatic treatment for pain**, for the neuralgia *per se*—a treatment partly rational and founded on experimental research, but in a much larger part, simply empiric. In this symptomatic treatment recourse may be had to so many, varied and different agents that to consider them all even succinctly would amount to a reproduction in this section of a large portion of the present work, since the treatment of pain brings into play nearly all known resources of drug treatment, physical therapy, and even psychotherapy. Preferable to such a plan, it would seem, is to condense all the main features of antineuralgic medication into a series of syllabic presentations and suggestive outlines.

AGENTS EMPLOYED IN THE SYMPTOMATIC TREATMENT OF PAIN.

EXTERNAL TREATMENT.

Counterirritation.—1. Rubs:

(a) Stimulating and counterirritant: Alcohol, turpentine, opodeldoc [*Linimentum saponato-camphoratum*, N.F.].

(b) Soothing and sedative: Belladonna and opium preparations; balsamum tranquillans [*Oleum hyoscyami compositum*, N.F.], chloroform liniment, oil of hyoscyamus, laudanum, salicyl liniments, etc.

2. Methyl salicylate, pure, in an ointment.

3. Menthol, in alcoholic solution, or rubbed on directly [*Menthol camphoratum*, N.F.]

4. Tincture of iodine, mustard poultices, nettle leaves.

5. Dry or wet cupping.

6. Cauterizations.

7. Refrigeration (methyl chloride spray or local application on a tampon).
8. Blistering, cantharidal plaster.
9. Electrocautery.
10. Fulguration (high frequency).

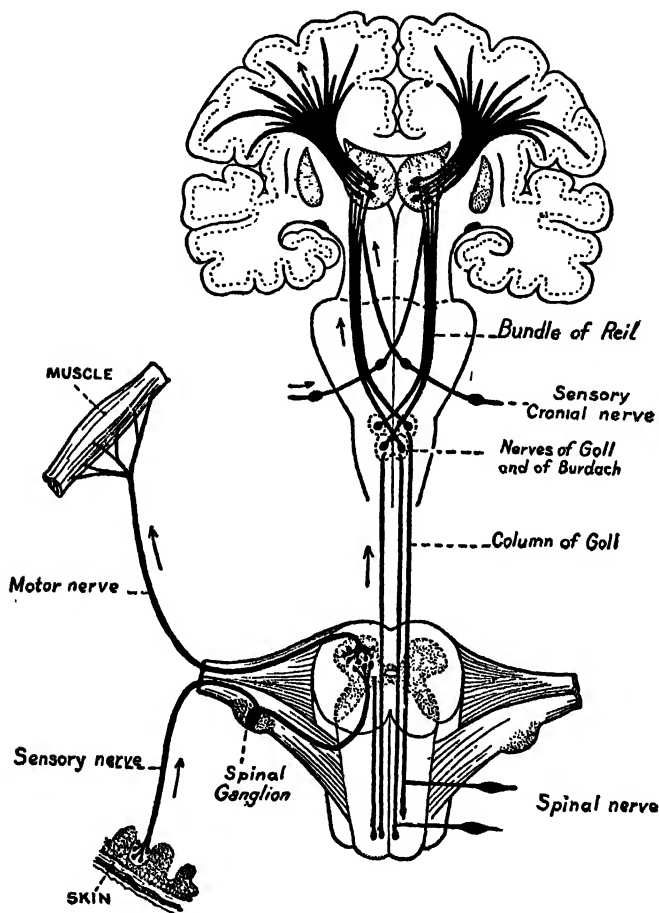


Fig. 252.—Diagram of the sensory nerve-paths.

Massage.—1. Reduction of the cellular perineuritis in the areas in which the nerves course close to the skin, which areas are precisely those in which are located the well-known tender points characteristic of a neuralgia induced by compression of the nerve and pétrissage (kneading).

2. Nerve-stretching by gradual stages (nerve-stretching in the pains of tabes; stretching of the spinal cord by suspension in tabetics—dangerous).

Heat and Light: 1. Poultices, hot compresses.

2. Hot air baths or douches.

3. Light treatment (especially by the ultra-violet rays from the Cooper-Hewitt mercury vapor lamp)—in superficial neuralgias only.

4. Turpentine vapor treatments.

Hydrotherapy.—1. Sedative hot baths.

2. Wet packs.

3. Local hot douches (40 to 45° C.—104 to 113° F.).

Electrotherapy.—1. Galvanic current. Salicyl ionization.

2. Static electricity. Franklinization.

3. High frequency.

4. Sinusoidal currents.

5. Diathermy.

X-rays or Radium.

A Few Formulas of Analgesic Applications.—Chloroform, laudanum, balsamum tranquillans, methyl salicylate, menthol, guaiacol, etc., may be combined in varying proportions.

Liniment:

℞ Chloroformi	3.5	c.c. (℥lv);
Tincturæ opii crocatæ (N.F.)	10	c.c. (f5iiss);
Olei hyoscyami compositi (N.F.)	20	c.c. (f5v);
Linimenti camphoræ (10 per cent.)	40	c.c. (f5x).

M. Sig.: For external use.

Ointments:

℞ Cocainæ hydrochloridi	0.5	gram (gr. viiss);
Mentholis	1	gram (gr. xv);
Methylis salicylatis	8	c.c. (f5ij);
Unguenti belladonnæ	60	grams (3j).

M. Sig.: For external use.

℞ Mentholis	1	gram (gr. xv);
Guaiacolis	4.5	c.c. (℥lxx);
Methylis salicylatis	8	c.c. (f5ij);
Petrolati,		
Adipis lanæ hydrosi	āā 30	grams (3j).

M. Sig.: For external use.

INTERNAL TREATMENT.

Drugs capable of relieving pain in general are very numerous. Enumeration and classification of these drugs will here be sufficient, the reader being referred to Part I: *Analgesics*, for their modes of administration.

From the pharmacologic standpoint these agents may be divided into three groups:

I. The Opium Group.—Opium is the time-honored, traditional, heroic, historic and probably prehistoric remedy for pain.

Opium and its preparations; morphine and its derivatives, including diacetylmorphine; also the total alkaloids (pantopon, etc.).

II. Analgesics Proper (antipyretics and antineuralgics).

(a) Antipyrin and its derivatives (amidopyrin, trigemin).

(b) Anilin derivatives (acetanilid, acetphenetidin, exalgin).

(c) Quinine and its derivatives.

(d) Sodium salicylate and its derivatives.

The last two groups are less exclusively analgesic than the others; their antipyretic and analgesic action, however, while more specialized than that of the members of the antipyrin and anilin groups, is nonetheless very pronounced, and furthermore, they combine very well with the latter drugs; hence the fact that they are grouped together.

III. Occasional Analgesics.—This group is far from having the homogeneity of the preceding groups. It is made up of substances either synergistic to the drugs already mentioned or possessing occasional analgesic properties. (See Part I for their action, dosage and modes of administration).

(a) Belladonna (or atropine), hyoscyamus and cannabis, synergists to opium as analgesics but antagonistic to it in other respects, *e.g.*, the action on the pupil.

(b) Aconite.

(c) Valerian, bromides.

(d) Caffeine.

(e) Methylene blue.

The above large assortment of analgesic remedies allows of almost innumerable combinations in various forms—powders, cachets, capsules, liquid preparations, etc. As large a proportion as 99 per cent. of the various unofficial preparations claimed to be specifics for headache and bearing names ending suggestively in *in*, *al* or *ol* are based on the foregoing drugs, embodied singly or in combination.

* * *

Antipyrin, introduced by Knorr in 1884, is the oldest and best known of the antineuralgics. Chemically, it consists of a central ring (isopyrazolon) to which have been attached two phenyl (C_6H_5) groups and two methyl (CH_3) groups. The methyl group plays an important rôle as an analgesic; introduced into an antineuralgic drug, it

enhances its action. The antineuralgic action of antipyrin is manifested from doses of 0.5 to 2 grams ($7\frac{1}{2}$ to 23 grains); it is powerful, constant and has procured for this drug a popularity which has never yet been surpassed.

From antipyrin, however, there have been produced derivatives which will bear comparison with, if not even overtop, the parent drug.

Such a derivative is **amidopyrin** (*pyramidon*), which is produced by addition to antipyrin of a dimethylamino group, $N(CH_3)_2$. In accordance with a well-known pharmacodynamic law, this introduction of two methyl groups considerably strengthens the analgesic action of antipyrin. Amidopyrin may be considered three times as active as [active in amounts three times smaller than] antipyrin, for which it is not infrequently substituted, sometimes with advantage. Amidopyrin is itself the basis of a number of salts, *e.g.*, amidopyrin camphorate and amidopyrin salicylate.

Another antipyrin derivative is **salipyrin**, a molecular combination of antipyrin and salicylic acid which rather happily combines the analgesic properties of the former component with the antirheumatic properties of the latter.

Antipyrin and its derivatives lend themselves, furthermore, as will be seen later, to synergistic or corrective combinations with the other groups of analgesics, with the hypnotics and with the heart stimulants.

* * *

Anilin ($C_6H_5.NH_2$) is a powerful antipyretic and analgesic, but cannot be used clinically on account of its toxic properties, especially its harmful action on the blood.

Synthetic pharmacology, through the application of two well-known principles, *viz.*, hydration and acetification, succeeded in enriching *materia medica* with a new series of antipyretic compounds possessed of the therapeutic properties of anilin, but at least relatively free from its toxic effects.

Acetanilid, which results from molecular combination of anilin and acetic acid, with elimination of water, is a very powerful antipyretic and analgesic in a daily amount of 0.5 to 2 grams ($7\frac{1}{2}$ to 30 grains) [caution!]. Unfortunately it retains some of the toxicity of anilin and sometimes brings on cyanosis or even collapse.

The same is true of **methyl-acetanilid** or **exalgin**, which is an extremely active analgesic in a daily amount of 0.25 to 1 gram (4 to 15 grains). Both of these compounds are contained in many unofficial analgesic preparations.

Much more serviceable are the **derivatives of paramidophenol** ($\text{OH} \cdot \text{C}_6\text{H}_5\text{NH}_2$), which is produced by hydration of anilin.

With this substance as the starting-point there is obtained, through combination with mineral or organic acids, a series of powerful and serviceable analgesics of which the best known are:

Acetphenetidin or *phenacetin* (acet-amido-ethylphenol), a combination with acetic acid, is active in daily amounts of 1 to 2 grams (15 to 30 grains).

Lactophenin, or lactic phenacetin, is a combination of paramidophenol with lactic acid, comparable in power with acetphenetidin.

Citrophen is a combination of paramidophenol with citric acid, comparable in activity with the preceding drugs.

Salophen, the salicylic ester of acetyl-paramidophenol, may be roughly considered as a salicylic derivative of acetphenetidin (an ethyl group being, however, lacking). Its analgesic action seems to be less certain, probably on account of excessively firm union of the constituent radicals.

* * *

Quinine, its salts and derivatives, constitute the third major group of antipyretics and antineuralgics.

Apart from the salts commonly used (sulphates, hydrochlorides, hydrobromide, etc.), the most interesting derivatives in this series are *aristochin* (double carbonate of quinine), *euquinine* (quinine ethyl-carbonate) and *quinoform* (basic formate of quinine). Aristochin, and especially euquinine, while as active as quinine, possess the advantage of being free of the bitter taste which makes the administration of quinine almost impossible in children. Quinoform, a freely soluble compound, facilitates the hypodermic administration of quinine, injections of quinoform solutions being almost painless and devoid of caustic action.

Synthetic pharmacology has produced compounds of quinine with salicylic acid (salochinin), with acetphenetidin (chinaphenin) and with antipyrin (chinopyrin), but these compounds have proven, for practical purposes, inferior to simple mixtures of the substances combined, probably on account of excessively firm intramolecular union.

* * *

The foregoing three groups of substances, variously combined among themselves or with other analgesic, hypnotic, heart-stimulant or eupeptic products, afford very many synergistic combinations predominantly antineuralgic in their action.

Thus, a synergistic combination of the three groups may be obtained as follows:

℞ Acetphenetidini,
 Quininæ dihydrochloridiāā 0.25 gram (gr. iv);
 Antipyrinæ 0.5 gram (gr. viiss).
 Ft. cachet. No. i. (Useful for pains in influenza.)

The analgesic action may be increased by the addition of exalgin and the depressing effects antagonized by the addition of caffeine:

℞ Caffeinæ,
 Exalgināā 0.1 gram (gr. iss);
 Acetphenetidini,
 Quininæ dihydrochloridiāā 0.25 gram (gr. iv);
 Antipyrinæ 0.5 gram (gr. viiss).
 Ft. cachet. No. i.

For simple neuralgia or migraine, the quinine in the above formula might be omitted.

The following three formulas can be strongly recommended in migraine.

℞ Caffeinæ 0.05 gram (gr. $\frac{3}{4}$);
 Quininæ hydrochloridi 0.1 gram (gr. iss);
 Antipyrinæ salicylatis 0.5 gram (gr. viiss).
 Ft. cachet. No. i.

℞ Acidi citrici 0.05 gram (gr. $\frac{3}{4}$);
 Caffeinæ 0.1 gram (gr. iss);
 Antipyrinæ 1 gram (gr. xv).
 Pone in chart. No. i.

℞ Caffeinæ 0.05 gram (gr. $\frac{3}{4}$);
 Acetphenetidini,
 Antipyrinæ salicylatisāā 0.4 gram (gr. vj).
 Ft. cachet. No. i.

The addition of citric acid promotes tolerance on the part of the stomach. Any of the foregoing combinations could, furthermore, be transformed into effervescent powders by the addition of tartaric acid and sodium bicarbonate, as in the following:

℞ Antipyrinæ 1 gram (gr. xv);
 Sodii bicarbonatis 5 grams (gr. lxxv);
 Acidi tartarici 2.5 grams (gr. xxxvij);
 Acidi citrici 2 grams (5ss).
 Pone in chart. No. i.

Finally, all these substances lend themselves to various synergistic combinations with morphine, the bromides, aconitine, caffeine, etc. The following combination acts extremely well in *dental neuralgia*:

℞ Morphinae hydrochloridi	0.01 gram	(gr. $\frac{1}{10}$);
Antipyrinae,		
Potassii bromidi	āā 0.6 gram	(gr. ix);
Acidi citrici	2 grams	(3ss);
Acidi tartarici	2.5 grams	(gr. xxxvij);
Sodii bicarbonatis,		
Lactosi	āā 5 grams	(gr. lxxv).
Pone in chart. No. i.		

In most of the above formulas the antipyrin might, for example, be replaced by amidopyrin or salipyrin, acetphenetidin by lactophenin or citrophen, quinine by euquinine or aristochin, etc.

OPERATIVE TREATMENT.

This consists of either injections of alcohol, water or air; analgesic injections of cocaine, procaine, etc., in the vicinity of the sensory nerve, or of surgical procedures at varying points on the sensory tract. An anatomic classification of these measures seems in order:

PROCEDURES RELATING TO THE NERVE-TRUNK OR ITS SKIN TERMINALS.—

Local Injections.—*Subcutaneous:* Distilled water, air, and various analgesic solutions (cocaine, procaine, stovaine, etc.) have been injected about the nerve terminals.

Massive hypodermic injections, intended especially to act by mechanical distention of the tissues (100 to 200 cubic centimeters—3 to 6 ounces—of normal salt solution or solutions of sodium sulphate or magnesium sulphate injected along the course of the nerve).

Deep: Along the course of or into the nerve; alcohol has been mainly used in this procedure, at least in trifacial neuralgia (see Part II: *Therapeutic Procedures*).

Local Operations: Direct nerve-stretching after incision (?).

Neurotomy, seldom used.

Nerve-dissociation, or stripping of the nerve-sheath (?)

Neurectomy, seldom practised except for neuromas.

PROCEDURES INVOLVING THE SPINAL NERVE-ROOTS AND GANGLIA.—
Not much employed.

PROCEDURES RELATING TO THE SPINAL CORD.

Epidural injections.

Lumbar puncture (see *Therapeutic Procedures*).

Subarachnoid injections (cocaine, stovaine, procaine).

PROCEDURES RELATING TO THE CENTERS.—Craniectomy.

Two varieties of neuralgia are of particular importance by reason of their frequency and obstinacy, *vis.*, *trifacial neuralgia* and *sciatica*. A short review of the treatment of each of these conditions seems appropriate.

TRIFACIAL NEURALGIA.

This is the form of neuralgia which involves the trigeminal nerve, with the Gasserian ganglion, and its three divisions—ophthalmic, superior maxillary and inferior maxillary—together with secondary reactions on the part of the facial nerve (painful spasm) and sympathetic system (vasomotor manifestations).

Sicard's classification is a very useful one from the standpoint of the treatment to be applied:

I. *Trifacial neuralgia secondary to:*

A local cause:

Intracranial: Tumor, syphilis, cancer, tuberculosis, etc.

Extracranial: Dental caries, sinusitis, cancer of the tongue, etc.; tuberculous, syphilitic or neoplastic formations in the pre- or post-ptyergoid fossæ, etc.

A general cause: Diabetes, gonorrhea, malaria, etc.

II. *Idiopathic trifacial neuralgia.*

III. *Trifacial neuralgism.*

These points having been recalled, the treatment may be summarized as follows:

1. TREAT THE CAUSE: Extraction of a tooth, drainage of a sinusitis, etc.

Removal of a polyp, tumor, neuroma, etc.

Treatment of syphilis, diabetes, gonorrhea, etc.

2. TREATMENT OF THE SYMPTOMS: Analgesics, such as antipyrin, amidopyrin, quinine, etc.

When necessary, the hypnotic analgesics: Opium and morphine.

In refractory cases, particularly of *idiopathic* (cryptogenic) *trifacial neuralgia*, recourse may be had to one of three heroic measures:

(a) *Salicyl ionic medication* (see *Therapeutic Procedures* and *Electrotherapy*).

(b) *Neurolytic injections* (see *Therapeutic Procedures*).

(c) *Aconitine nitrate ionic medication*, recommended by Barié and Delherm, who report excellent results from its use.

In this procedure the ionization is carried out in the usual way. The electrode on the face is moistened with the following solution:

R. Aconitinæ nitratis 0.00025 gram (gr. $\frac{1}{280}$);
 Aquæ destillatæ 125 c.c. (f3xxxiv).
 S. Sig.: Poison! For external use. (BARIÉ.)

This electrode should be connected with the positive pole. A large negative, indifferent electrode is applied over the cervicodorsal region. The duration of the sitting is $\frac{3}{4}$ hour. A current of 40 to 60 milliampères, according to tolerance, is used.

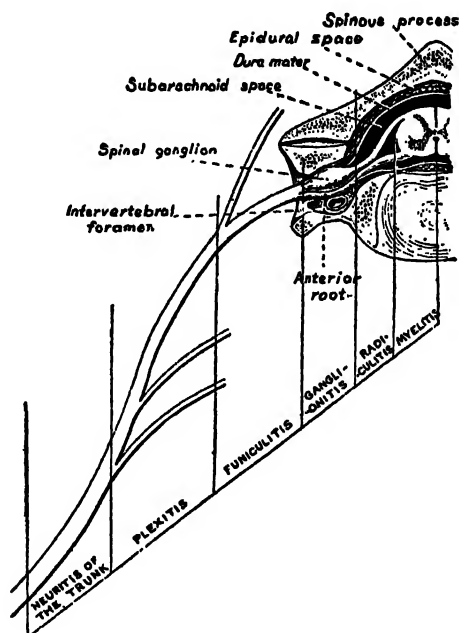


Fig. 253.—Anatomic varieties of sciatic neuralgia (*Sicard*).

SCIATIC NEURALGIA.

Its **cause** should be carefully looked for and treated in the most efficient manner possible.

Infections:

Syphilis: Antisyphilitic treatment.

Gonorrhea: Local treatment; if need be, bacterial vaccines.

Malaria: Quinine and arsenic.

Rheumatism: Sodium salicylate.

Tuberculosis: Look for and treat Pott's disease or pachymeningitis.

Influenza: Quinine, antipyrin, acetylsalicylic acid, etc.

Diatheses:

Diabetes mellitus, gout or uricemia, upon which sciatica so frequently depends, should be suitably treated.

Trauma and local infections:

Hematoma of the buttock following a fall, varicose veins, foreign bodies, Pott's disease, pelvic lesions or lesions of the uterus or rectum should be properly cared for.

The **symptom** pain should be met both by general and local treatment.

Medicinal Treatment.—The *analgesics* of the anilin series and antipyrin, while really exerting a selective action in trifacial neuralgia, are much less effective in the cases of sciatica, require to be used in much larger doses, and give way to the *salicyl derivatives*, the *opiates* and *bella-donna*.

Recourse should, therefore, be had to the analgesics already mentioned, due account being, however, taken of the feature just pointed out.

Local Treatment.—The symptom being often very obstinate, there should be brought into requisition empirically *all the local sedative, analgesic and counterirritant measures* previously enumerated (applications, ointments, liniments, cauterization, wet cupping, blisters, spraying, etc.) and the use of the *whole series of physical agencies* (massage, nerve stretching, hot air, applications of ambrine, the various electrotherapeutic measures, ionic medication, the X-rays and radium), further comment on which is unnecessary (see the separate sections on these procedures).

In refractory cases, and according to whether the disturbance involves the nerve-trunk, funicular portion or nerve-roots, recourse may be had to *perineural, intraneural, epidural or intraspinal injections* (Sicard).

The *deep, perineural injections* in the cellular or muscular tissues in the vicinity of the nerve are carried out by Sicard for the purpose of counterirritation. The fluid used may be alcohol, distilled water, isotonic antipyrin solution, etc. Hypodermic injections of air or oxygen gas in the lumbar region, the outer aspect of the thigh, or over the head of the fibula have also been recommended.

The *intraneural injections* should be made at the junction of the inner third and outer two-thirds of a line drawn from the sacrococcygeal joint to the postero-external border of the great trochanter. The needle is introduced for a distance of 5 to 9 centimeters (2 to $3\frac{3}{5}$ inches) in the direction of the spine of the ischium until the patient experiences pain along the nerve.

The *solution used* should consist of 40 to 100 cubic centimeters ($1\frac{1}{3}$ to $3\frac{1}{3}$ ounces) of a 0.04 per cent. solution of cocaine or stovaine in physiologic salt solution, and should **not** consist of neurolytic sub-

stances such as alcohol, phenol or chloroform, which would destroy the nerve and lead to paralysis.

In *epidural injections*, 10 to 20 cubic centimeters ($2\frac{1}{2}$ to 5 fluidrams) of 1 per cent. cocaine or stovaine solution in physiologic salt solution are injected through the sacral hiatus into the pocket existing outside of the spinal dura mater in the sacral canal below the level of the second sacral segment.

The technic of *intraspinal injections* is identical with that of spinal anesthesia. Ten to 20 cubic centimeters of a 0.1 per cent. solution of stovaine in physiologic salt solution are injected.

Finally, **in very refractory and selected cases**, certain surgical procedures may be attempted:

- (a) Removal of varicose sections in varicose sciatica.
- (b) Stripping, stretching or dissociation of the nerve fibers.

OBESITY.

[Obesus, *stout*; *overnourished*.]

Obesity is a morbid syndrome devoid of specificity, and it is to make a formal assertion of this fact that I take up its treatment in this portion of the work, dealing with the treatment of symptoms.

The treatment of obesity comprises that of the obese condition *per se* and that of its underlying causes.

I. TREATMENT OF THE SYMPTOM, OBESITY.

Whatever criticism of certain details be offered, it is quite evident that the time-honored principle underlying this treatment, *vis.*, reduction of the intake and increase of the expenditures, still holds good.

A. Reduction of the Intake.—This consists in ordering a reducing diet which, with due allowance for the digestive and metabolic deficiencies in the particular individual, shall be inferior to the requirements of the system. This implies that the diet must be specifically determined for each case, after careful observations and systematic dietetic tests, and it is well to discard at once all the well-known dietary systems of Schwenger, Ebstein, Germain Sée, Dujardin-Beaumont, etc., which may be looked into for suggestions, but which, while they may exceptionally be suitable for a certain variety of obesity or a certain individual, are harmful to the majority of cases.

In a general way, it may be put down that the **foods which are the most fattening and which must consequently be interdicted** are:

Fats and fatty foods (sauces, stews, fat meats, etc.).

Sugar and sweet articles (pastry, confections, desserts, etc.).

Articles made with flour and starchy foods (bread, macaroni, etc., rice, beans, lentils, chestnuts, etc.).

Salt and salty foods (especially in cardiorenal cases and those with chloride retention and hydremia).

Beer, alcohol, and liqueurs must be absolutely interdicted, though wine and cider may be allowed, but only in moderation.

On the other hand, the **foods which are the least fattening and which may consequently be allowed** are:

Vegetable foods containing much cellulose and water: Green vegetables, salads and fruits, which may be permitted in large quan-

tities; they fill up the stomach of heavy eaters and contribute to the production of a feeling of satiety which is indispensable in some individuals.

The protein foods of animal origin (lean meats, fowl and fish), which should be allowed in moderation—as they become transformed into fat only with difficulty—supply the system with the necessary amount of albumin and contribute to the development of that reflex dynamogenic action which, apart from the caloric value of a diet, “produces on the nervous system a sensory and special sense stimulation which reacts on motility and secretion, first in the digestive tract and secondarily in other systems. In this reflex dynamogenic rôle, the psyche always participates, for the brain is able to recall the memories of special sense impressions—olfactory, gustatory and tactile—which have been received in earlier gastronomic experiences.

“Accordingly, in the treatment of obesity, care should be taken to avoid *disheartening types of diet* which very quickly break down all good resolutions in regard to eating, *e.g.*, a milk diet, vegetarian diet, fat diet, liquid diet, starvation, etc.” (Heckel).

The question of the amount of fluid to be allowed is particularly difficult to answer and should be settled only after observation of the cardiorenal functions. In general, plethoric obese subjects in whom the heart and kidneys are plainly a contributing factor may and should be authorized to drink copiously of pure water or of beverages free of alcohol and sugar (lemonade, infusions, etc.); in pale obese subjects with hydremia, on the other hand, there is advantage in approximating a semi-dry diet.

In short, the general dietetic rules above described should be accepted as the first, approximate step in the treatment; their application should then be adjusted to the individual patient in accordance with his personal characteristics, the variety of disorder present and the results of feeding tests.

Following, as described by Heckel, are **four principal types of diet for the obese**, according to whether the patient is a heavy or light eater and whether the obesity is pronounced or slight:

A. HEAVY EATER.

A large bulk of food. Two meals a day, as follows:

1. Hors-d'œuvre: Vegetables with vinegar dressing, tomato, celery, cucumber, salads, radishes—100 grams.
2. One egg, prepared in any desired way.
3. One meat or fish without sauce (any form of preparation is allowable); the weight of the cooked food to be permitted should

equal in grams the weight of the patient in kilograms (*e.g.*, 80 grams of meat in a patient weighing 80 kilos.) [1 kilogram = 2.2046 pounds].

4. One green vegetable *ad libitum*.

5. Raw or cooked fruits *ad libitum*.

Not much exercise at first.

B. LIGHT EATER.

1. One meat

2. One green vegetable

3. Fruit

} at each of the two meals, as described above.

C. MAJOR OBESITY.

First day: Purge and restriction to water.

Second day: Purge and vegetable diet.

Thereafter: At each of the two meals:

1. Hors d'œuvre, vegetables only.

2. One egg or fish.

3. One meat.

4. Green vegetables once a day, in alternation with potatoes (120 grams).

5. Fruits, coffee.

Not much exercise at first.

D. MINOR OBESITY.

At each of the two meals:

1. One egg or 50 grams of fish.

2. One meat (1 gram per kilogram of body weight).

3. One green vegetable or starchy article (the latter limited to 100 grams).

4. Fruits.

Much exercise from the start, with hot or cold hydrotherapeutic measures according to the case.

"The breakfast consists of tea or coffee with milk, with or without cold meat or eggs, with or without fruit according as the case is one of major or minor obesity and the patient a heavy or a light eater."

Two cups of weak tea with sugar at 4 p. m. may be allowed light eaters and a cup of coffee with milk allowed heavy eaters and cases of minor obesity when much exercise is being taken.

Coffee without milk and wine are ordered in atonic, anemic, sluggish subjects.

It should be pointed out once more that all diets, of whatever sort, are subject to regulation on the basis of clinical observation, and

that if the weight remains stationary and the blood-pressure and output of urine high, it will be advisable to "put the screws down" as regards the diet. If, on the other hand, the weight and blood-pressure show a rapid drop and actual asthenia is produced, it will be necessary to return to a more liberal diet and have recourse to tonic and stimulant therapeutic adjuncts (strychnine, adrenalin, etc.). **Unsupervised reduction cures may bring disaster, especially as regards the heart and kidneys.**

At the close of the treatment Heckel recommends, either a truly normal diet, adapted to the requirements of the individual subject, or the following standard diet for a man weighing 70 kilograms:

BREAKFAST: Coffee with milk; 30 grams of buttered bread.

LUNCH AND DINNER, each to consist of:

Two eggs or one fish.

One meat, 80 grams.

One green vegetable or starchy article, 100 grams.

One dessert, 100 grams, or fresh cheese, 20 grams.

Fruits *ad libitum*.

Bread, 40 grams.

If desired, one cup of coffee.

AFTERNOON TEA with crackers, if desired.

FLUID BETWEEN MEALS: One liter, without alcohol or sugar.

B. Increased Energy Expenditures.—Exercise, motion, muscular activity, walking and sports in progressive amounts have at all times been considered an indispensable adjunct of diet in the treatment of obesity, but credit is unquestionably due F. Heckel for having shown that the *muscular treatment* is, on a par with the *alimentary treatment*, an essential therapeutic factor, and for having determined most accurately the forms of exercise to be prescribed. For details other than those here given, the reader is referred to Heckel's books on obesity.

Like the diet, the exercise treatment must be determined for each individual case. Obviously, the directions relative to exercise cannot be the same in a cardiorenal obese subject with high blood-pressure and in a plethoric obese person with good compensation, nor in the latter person and an anemic obese patient with low blood-pressure.

In the presence of marked hypertension, the myotherapeutic stage should be preceded by a **preparatory stage** of reduction while at rest, in which the aim is to obtain a preliminary lowering of the high blood-pressure by means of diet, repeated purgation, and even local blood-letting (wet cupping) or venesection. Only after the blood-pressure has fallen from 280 to 220 mm. Hg or from 260 to 200 should the patient begin to take exercise.

The muscular treatment, as specified by Heckel, involves two varieties of movements: (1) *Adipolytic movements*, causing fat destruction, consisting of muscular activity at a rapid rate interspersed with rapidly repeated respiratory movements; (2) *myogenic movements*, calculated to build up the muscular masses, consisting of slower movements performed in a regular rhythm, if necessary with the added use of heavy weights.

The series of exercises should be naturally progressive, with their progression regulated according to observation.

Their aim should be to bring successively into action most of the muscles; they should therefore be varied. Certain exercises should be recommended by preference according as the morphologic condition of the body leads to a desire for reduction of the corresponding region. As soon as the degree of physical training reached will permit, abdominal exercises calculated to build up abdominal support should be added.

Lastly, it should be remembered that boredom once upon a time was born of monotony, and that it is advisable to graduate, vary and liven up these exercises; otherwise the séances will be gloomy and monotonous, and the patient will get disgusted very soon. This is one of the stumbling-blocks in Swedish gymnastics, which often prove a failure in the more petulant Latin races. It is well to bear this feature in mind in the selection and performance of the exercises.

The duration of each séance should depend on the endurance of the patient and the results obtained. The exercises should be taken daily, for a period of fifteen minutes to one hour.

Only after at least a month has been spent in myotherapeutic training, and the patient has "learned to sweat" profusely during the exercising, should exercise of a more sporting nature, according to Heckel, be taken up.

Ordinary *walking* really yields no results unless it is continued at least an hour, and is carried out at a brisk rate, covering at least 6 to 8 kilometers ($3\frac{3}{4}$ to 5 miles) an hour (for a man of average height); to be effective it should induce perspiration. Walking in mountainous country is likewise to be recommended, but the heart must be strong in this event.

One would expect *running* to be the exercise of choice; but it must be duly supervised. It can be suited only for already half reduced obese subjects with normal hearts already in a high state of training; this kind of obese subject is not the commonest one. Heckel recommends running at the rate of 12 kilometers ($7\frac{1}{2}$ miles) an hour for distances increasing from 100 meters (or yards) to 2 kilometers ($1\frac{1}{4}$

miles) for a man forty years of age; the heart-rate may without especial harm rise to 135 or 140. In any case, an insurmountable obstacle to this form of exercise is very often met with in the scarcity of establishments in which the necessary running track is available.

Tennis and *bicycle riding*, while not as valuable as the preceding form of exercise, are nonetheless pleasant substitutes for it.

Fencing does not yield much in the way of adipolytic results. The expenditure of nervous energy it entails is out of proportion to that of muscular energy.

Swimming in running water or in the ocean is of very great value; essentially, it combines *hydrotherapy* and heat withdrawal with *myotherapy*.

Hydrotherapy in all its forms—douches, tepid baths made progressively colder, cold baths, very hot baths, steam baths—may be recommended in selected cases. Light baths may be useful.

Massage, especially the douche-massage of the type practised at Aix-les-Bains [kneading of the muscles + a general and abundant douche of thermal water] is to be recommended.

Bergonié, in obese cases with heart disease or general depression, recommends *electrically induced exercise*. The arms and legs are placed in receptacles receiving a rhythmic faradic current; involuntary and painless contractions of most of the muscles are thus obtained during the twenty to forty-five minutes of each séance.

II. TREATMENT OF THE CAUSE OF OBESITY.

Obesity due to overeating and rapid eating:

Instructions as to the manner of eating, especially as regards mastication. Severe and strictly followed reduction diet. The subject must develop new *habits* of eating. A phobia of overeating and getting stout must, in a measure, be fostered.

Constitutional, inherited obesity in the sons of gouty or lithiasic parents:

Instructions as to eating, diet low in proteins, purins, etc.

Alkaline sulphate thermal cures, reducing and purgative.

Iodine and iodides.

Physical training.

Obesity of toxic or infectious origin:

Alcoholism: Radical withdrawal of alcohol.

Post-typhoid: Adrenalin.

Post-syphilitic: Repeated courses of iodide and mercury.

Tuberculous: Paradoxical.

Obesity of digestive origin:

Gastro-intestinal insufficiency should be combatted by judicious use of the digestive ferments (pepsin, papain, pancreatin, enterokin-

ase), of the hepatic stimulants (liver extracts, bile extracts, calomel, sodium salicylate, etc.), of the alkalies and phosphoric acid, and of the saline purgatives.

Obesity of anemic origin:

Iron preparations.

Hypodermic injections of oxygen gas.

Organotherapy (bone marrow, hematopoietic serum).

Obesity due to endocrin insufficiency:

Obesity of oöphorectomy and of the menopause: Ovarian extract.

Obesity of testicular atrophy: Testicular extract.

Obesity of dysthyroidia: Thyroid extract.

Pituitary obesity, including the adiposogenital syndrome (Babinski, Fröhlich), characterized clinically by: (1) Obesity especially abdominal and gluteal; (2) aplasia of the genital organs with lack of development: Pituitary medication.

Lastly, **some cases of obesity remain irreducible** (Labbé), no matter what is done for them. In these patients there is as much edema as there is excessive fatty deposit. The system has completely broken down; the heart, liver and kidneys are degenerated, and the obese patient is more of a cardiorenal case than he is one of obesity.

Needless to state, under such conditions all etiologic medication becomes useless and any strict diet or attempt at rather rapid physical training attended with danger, exposing the patient to serious accidents and even sudden death. In such a case treatment should therefore be limited to a dry diet or a chloride-free diet, or sometimes even a milk diet. In conjunction with the customary cardiorenal treatment, such measures will merely serve to postpone the inevitable fatal issue.

From the above considerations the reader will have understood **how much the treatment of obesity must be adjusted to the individual case.**

The **drugs** most commonly used in the obese are the *purgatives, alkalies, iodine and its derivatives, thyroid and ovarian extracts, and tonics.*

The **purgatives** are obviously the empiric remedies most frequently employed in the treatment of obesity. While sometimes prejudicial by reason of the dyspeptic and enteritic manifestations to which their use may lead, they are often useful in the plethoric, full-blooded obese patients with permanent abdominal congestion.

The saline purgative waters (such as those of Châtel-Guyon, Brides, Kissingen, Homburg, Carlsbad and Marienbad) act, on the whole, by promoting activity of the liver, regulating the secretion of bile and insuring proper functioning of the bowel. Combined with

alkalies, as in the waters of Carlsbad, they act in a threefold manner through stimulation of the liver and biliary secretion, intestinal evacuation, and alkalization of the blood—the latter action accelerating interstitial dissolution and the combustion of fat.

In these cases I often prescribe the Carlsbad salts; one to two teaspoonfuls to be taken in the morning on an empty stomach in a wineglassful of hot Vichy water (Grande-Grille).

Or:

℞ Sodii sulphatis exsiccati,
Sodii citratis exsiccati,
Sodii bicarbonatis exsiccatiāā 50 grams (℥iss).

M. Sig.: One to two teaspoonfuls [according to the effects produced] in the morning in a glassful of warm water.

Or, in rheumatic or gouty patients:

℞ Sodii sulphatis,
Sodii citratis,
Sodii bicarbonatisāā 50 grams (℥iss);
Sodii salicylatis 25 grams (ʒvj).

M. Sig.: One to two teaspoonfuls in the morning in a glassful of warm water.

Most of the unofficial remedies (powders, pills, etc.) asserted to be useful in obesity are simply and solely laxatives or purgatives of mineral or vegetable origin.

I shall add merely a few words relative to the use of *purgatives* and of thyroid gland.

Personally, I recognize mainly three more or less absolute *indications for the systematic use of laxatives or purgatives* in obesity:

1. *Plethora*, hepatic and abdominal congestion, in which I use the alkalies and saline purgatives (sodium bicarbonate and sodium sulphate).

2. *Heart fatigue*, with a tendency to edema or partial heart failure, in which I use the vegetable cathartics (aloes, scammony, compound tincture of jalap).

3. *Gastro-intestinal atony*, fecal stasis and constipation, in which I use the oily or mechanically acting cathartics (castor oil, linseed, senna).

Thyroid gland, after having been discarded by most observers, has properly recovered an appreciable position in the treatment of obesity. Its use requires extremely careful watching, but its action is obvious in many cases; the reduction of weight is often unquestionable.

Accidents in persons under thyroid treatment have been reported. Generally, "they occur where patients are treating themselves indiscriminately or to excess, where the heart is enlarged and degenerated, or where there are valvular or aortic lesions."

They can be almost certainly avoided:

1. By disallowing thyroid treatment in patients with disease of the heart or aorta, or whose pulse-rate exceeds 100 to the minute.
2. By starting the treatment with moderate progressive doses and interrupting it in the event of marked acceleration of the pulse (over 100), palpitations, sleeplessness or tremor.
3. By not exceeding 1 kilogram (2.2 pounds) as the amount of weight lost per week.

With these precautions duly taken, desiccated thyroid gland may be prescribed, in the presence of known (myxedema) or suspected thyroid insufficiency, to the amount of one to two tablets of 0.06 gram (1 grain) each, corresponding to 0.3 to 0.6 gram (5 to 10 grains) of the fresh gland. The amount should be increased gradually from the one tablet to the two tablets. One might even begin with half a tablet a day.

Ovarian extracts may be of service in obesity the result of ovarian dysfunction (obesity of puberty, of the menopause, of lactation, following oöphorectomy, etc.), at least in allaying the related disturbances (hot flushes, palpitations, irritability, etc.)—obesity *per se* being, as a rule, little influenced by them.

* * *

In conclusion, the following **three standard diets suitable for two of the commonest types of obesity** may be of service:

I.—Obesity of Intermediate Degree in an Adult.

Height, 170 cm. (5 ft. 7 in.); weight 100 kilograms (220 lbs.); plethoric; blood-pressure, systolic, 240 mm. Hg; diastolic, 120 mm.; blood viscosity, 5.8. No organic disease; digestive functions excellent.

A. The INSTRUCTIONS AS TO THE DIET may be summarized thus:

Masticate thoroughly and carefully; do not remain at the table more than $\frac{1}{2}$ hour; leave the table before the appetite is satisfied.

Breakfast:

One or two cups of weak tea without sugar; half a roll.

Lunch (noon):

Lean ham or smoked tongue, 60 grams.

Meat of any sort, broiled or roasted, 140 grams.

Green vegetables and salad *ad libitum*.

Raw or cooked fruits without sugar *ad libitum*.

Salad instead of bread; if need be, two boiled potatoes or 30 grams of bread.

Afternoon tea (4 P.M.):

One or two cups of infusion (tea, camomile, linden, verberna, etc.) or a tumblerful (250 c.c.) of water or lemonade.

Dinner (7 P.M.):

Two eggs or a dozen oysters, or fish (120 grams), or fowl (120 grams), or game (half a partridge, one quail, etc.).

Green vegetables and salad *ad libitum*.

Cooked or raw fruit without sugar *ad libitum*.

In the evening:

One or two cups of infusion (as at 4 P.M.).

On retiring:

A tumblerful (250 c.c.) of water.

NOTE.—Not more than 100 grams of butter should be used in the preparation of the food.

B. GENERAL HYGIENIC MEASURES.

(a) At most seven to eight hours of sleep.

Daily periods of progressive muscle training lasting 15 to 45 minutes and involving three kinds of exercises, combined and alternating:

1. Rapid adipolytic movements.
2. Slow myogenic movements.
3. Respiratory movements.

(b) Get accustomed gradually to walking at least two hours a day—10 to 14 kilometers ($6\frac{1}{4}$ to $8\frac{3}{4}$ miles).

Play billiards, ride bicycle, etc.

(c) Every *morning*, a thorough general wash and cool tub bath followed by a rub, massage, or better, auto-massage.

C. DRUG TREATMENT:

Three times a week, take in the morning with a wineglassful of warm Vichy water:

Either one or two teaspoonfuls of Carlsbad salts.

Or one or two teaspoonfuls of the following:

℞ Sodii sulphatis exsiccati,
Sodii citratis exsiccati,
Sodii bicarbonatis exsiccatiāā 40 grams (3x).—M.

Three times a week, take in milk, just before breakfast, 11 to 20 drops of the following:

℞ Tincturæ iodi (10 per cent.) 20 c.c. (f3v);
Potassii iodidi 15 grams (3ss);
Glycerini 12 c.c. (f3ijj).—M.

D. IMPORTANT REMARKS:

If the urine becomes scanty, turbid, reddish or thick, the amount

of fluid taken should be increased, a specimen of urine sent for examination, and the physician consulted.

If the tendency to breathlessness increases or if the pulse rate reaches and exceeds 100 after walking, the amount of exercise taken should be reduced and the physician consulted.

An exact record of the weight and waist measure should be made twice a week.

II.—Obesity of Intermediate Degree in an Adult.

Age, 25 years; height, 160 cm. (5 ft. 3 in.); weight, 90 kilograms (190 lbs.); anemic, sluggish; blood-pressure, systolic, 140 mm. Hg; diastolic, 100 mm.; blood viscosity, 3.5. No organic disease; digestive functions normal; circulation sluggish; chloride elimination impaired.

A. DIET.—Same diet as in I, with special stress on red meats, broiled or roasted, yolks of eggs, fresh calves' marrow; also spinach, water cress, tender salads, etc.

As regards the chlorides, restriction of chlorides under the guidance of chloride determinations in the urine should be carried out intermittently—in alternate weeks or two days in each week.

B. GENERAL HYGIENIC MEASURES.

(a) Not over eight to nine hours of sleep.

(b) As in I.

(c) Every morning, a cool sponge bath, massage, and a general stimulating rub with:

℞ Tincturæ nucis vomicæ	10 c.c. (f3iiss);
Terebinthinæ laricis	20 c.c. (f3v);
Tincturæ cinnamomi	1 c.c. (℥xxv);
Alcoholis	120 c.c. (f3iv).

M. Sig.: For external use.

C. DRUG TREATMENT.

For ten days in each month: *Hematogenous medication*, consisting in the ingestion of hematopoietic serum (serum from horses in process of blood regeneration after bleeding).

For the next ten days: *Neurosthenic medication*:

℞ Strychninæ sulphatis	0.02 gram (gr. $\frac{1}{8}$);
Sodii glycerophosphatis	5 grams (gr. lxxv);
Aquæ destillatæ sterilisatæ	20 c.c. (f3v).

M. Sig.: Two cubic centimeters (30 minims) to be injected daily.

For the final ten days: No drug treatment.

III.—Obesity with Abdominal Gaseous Distention, Cardio-renal Insufficiency and Chloride Retention.

This symptom-group is extremely common, especially in women at the menopause. Excessive fat deposition, considerable abdominal distention and congestion of the liver, increasing edema of the lower extremities and dyspnea on exertion, respiratory insufficiency, and sometimes traces of albumin characterize this condition even on the most perfunctory clinical examination, while all definite disease of the heart, lungs or kidneys is as yet absent.

The therapeutic indications are many:

1. *Treatment for purposes of weight reduction, chloride elimination and dehydration*, directed against the obesity, the retention of chlorides and the edema.

2. *Treatment for purposes of gastro-intestinal evacuation and hepatic decongestion*, directed against the abdominal distention and plethora.

3. *Heart-tonic and diuretic treatment*, partly fulfilled by the preceding measures, supplemented by suitable medication.

These indications can be met in various ways. The following plan has frequently given me gratifying results:

I. CHLORIDE-FREE DIET *consisting chiefly of fruit and vegetables*, with 80 to 100 grams of broiled meat or fowl or fish at one of the meals.

Reduction or interdiction of sugar and sweet articles, of starchy foods and those made with flour, of pastes (macaroni, etc.) and of fats and fatty foods.

Bread (chloride-free, if possible): 100 grams a day.

One or two days a week: An almost exclusive fruit diet (diet containing the least protein and chlorides).

Cooked or thoroughly ripe fruits, dry biscuits, infusions.

II. DRUG TREATMENT:

(a) *For ten days in each month:*

Theobromine, 0.5 gram ($7\frac{1}{2}$ grains), with or without 0.05 gram ($\frac{3}{4}$ grain) of digitalis leaves, in a cachet. One cachet on awakening and again on retiring, with a wineglassful of warm Vichy water (Grande-Grille).

(b) *For the next ten days:*

℞ Scillæ pulveris,
Resinæ ipomœæãã 0.05 gram ($\frac{3}{4}$ grain).
Ft. pil. No. i. Da tal. No. xl.

Sig.: Three to four pills a day between meals (according to the results obtained—one or two good bowel movements, satisfactory diuresis).

(c) *For the last ten days:*

℞ Tincturæ iodi (10 per cent.) 12 c.c. (f3ij);
 Potassii iodidi 10 grams (3iiss);
 Glycerini 8 c.c. (f3ij).

M. Sig.: Eleven to twenty drops in milk at breakfast.

III. PHYSICAL MEASURES:

- (a) Exercises to strengthen the abdominal muscles; breathing exercises.
- (b) Graduated walks.
- (c) Lukewarm hydrotherapeutic measures and daily general rubs.
- (d) Carbonated baths twice weekly at 36 to 38° C. (96.8 to 100.4° F.)
 of ten to twelve minutes' duration.
- (e) Open air life as much as possible; windows open at night.

OLIGURIA.

In a case of **reduced urinary output** the physician should first of all make sure that it is not the result of:

Insufficient ingestion of water (dry diet, famine diet), in which event the subject should be directed to drink more water between meals and even in the night.

Pronounced loss of water through channels other than the urinary tract (diarrhea, sweats, fever, etc.), in which case the diarrhea or sweats should receive appropriate treatment.

Aside from these cases, it is always cardiac insufficiency, or renal insufficiency, or more rarely hepatic insufficiency, which must be looked for and treated.

Oliguria due to cardiac insufficiency is amenable to the treatment appropriate for the latter condition (see *Diseases of the Circulatory System*).

1. Rest in recumbency.
2. Restricted diet, low in chlorides, with reduction of the fluid intake.
3. Heart-tonics (digitalis).
4. When required: Wet cupping, vein puncture and drainage of edema.

Oliguria due to renal insufficiency—the latter generally of the chloridemic or chloridohydremic form—is often combined with the oliguria of cardiac origin, and its treatment is rather similar.

1. Rest in recumbency.
2. Restricted diet, chloride-free or low in chlorides.
3. Cardioresenal diuretics:
 - (a) Lactose, theobromine, squill, calcium chloride.
 - (b) When required: Digitalis, caffeine, camphor in oil, etc.
4. Wet cupping in the lumbar regions, reduction of the fluid intake and drainage of edema.

Oliguria due to hepatic insufficiency (portal hypertension, hepatic congestion and cirrhoses, etc.).

1. Rest in recumbency.
2. Milk diet or restricted diet of milk, vegetables and fruits.
3. Purgatives and cholagogues:
 - (a) Calomel, squill, scammony, compound tincture of jalap.
 - (b) Sodium sulphate in fractional doses.
 - (c) Hepatic organotherapy.
4. When required: Wet cupping over the liver. Tapping for ascites.

PAIN IN THE SIDE.

Only exceptionally is **pain in the side**—whatever be its cause—sufficiently severe and persistent to require any very active treatment.

In any case, the general principles of the treatment of neuralgia (*q.v.*) would be applicable.

In the special instance of a pain in the side demanding active treatment, recourse could be had to certain standard measures:

1. **Local Counterirritation.**—The following procedures are mentioned in the order of increasing activity:

(a) Mustard applications or poultices, tincture of iodine.

(b) Hot moist packs.

(c) Applications of tincture of iodine with the addition of guaiacol, 1:4; applications of methyl salicylate or of an analgesic combination of the following type:

R. Chloroformi	3.3	c.c. (m℥)
Tincturæ opii crocatæ (N. F.)	10	c.c. (fʒiiss);
Olei hyoscyami compositi (N. F.)	20	c.c. (fʒv);
Linimenti camphoræ (10 per cent.)	30	c.c. (fʒj).

M. Sig.: For external use.

(d) Wet cupping at the seat of pain.

(e) A fly blister (see Part II: *Blistering*); application of a small piece of cantharidal plaster over the surface of which has been applied a saturated solution of camphor in ether; the plaster is allowed to remain for eighteen hours and the surface then dressed with a 5 per cent. ointment of morphine in petrolatum.

2. **General Treatment.**—Aside from the treatment of the causal disease (pleurisy, pneumonia, pericarditis), the various analgesics may be selected from to best advantage:

(a) Sodium salicylate and acetylsalicylic acid, especially where the causal factor seems to be rheumatic fever or gout.

(b) Antipyrin and its derivatives, with or without quinine.

(c) Morphine, if the pain and resulting dyspnea are really very distressing. An injection of morphine, or better, of the total alkaloids of opium, remains the measure of last resort for all pains that are severe or persistent. There may possibly be some advantage in administering such injections *loco dolenti*.

PLETHORA.

[πλήθειν, to be full.]

In **plethora** with functional high blood-pressure and high blood-viscosity, the **four major indications** are as follows:

(a) **Pronounced reduction of the aggregate of food taken:** Proteins, fats, starches and chlorides.

All these individuals are bulimic, and the aggregate of food taken by them is excessive. Their blood is overburdened, too thick and too viscid; they are mostly gouty, lithiasic, diabetic or obese subjects. They must be made to lose weight, their food intake being reduced for the purpose.

Aside from the special varieties of the condition and the particular indications relating to the diseases present—lithiasis, gout, diabetes—or based on direct observation of the individual case, a diet corresponding to the following outline should be recommended:

Breakfast: Coffee with milk, 200 c.c., or fresh fruit in season.

Lunch (noon): Broiled or roast meat without sauce, 100 grams, or fowl or lean fish.

Potatoes or carrots; or green vegetables *ad libitum* (except spinach, sorrel and mushrooms).

Cooked or raw fruit (oranges, tangerines, grapes).

Bread, at most 60 to 80 grams.

Fluids, 500 cubic centimeters (water or infusions).

• *Afternoon tea* (4 P.M.): 200 to 250 cubic centimeters of tea or other infusion, mineral water or lemonade.

Dinner (7 P.M.): 400 cubic centimeters of lean soup; one or two eggs; vegetables and dessert, same as at the noon meal; 400 cubic centimeters of water.

On retiring: 200 to 250 cubic centimeters of lemonade.

NOTE.—Not over 4 to 6 grams of salt should be used in the preparation of the above articles. Lemon juice should be used freely instead of condiments; systematic lemon cures may even be given—1 to 4 lemons a day.

(b) **Plenty of fluid.**—These patients show a high blood viscosity and are often uricemic. They have considerable cardiorenal reserve power. A process of blood-washing, by giving fluids in large amount, can and should be instituted in them. The water ingested will re-

appear in the urine laden with various inorganic and organic substances of which the system will thus be rid. It will be noticed that the diet outlined above includes 2 liters of fluids, to which is to be added the water contained in the foods and used in their preparation (fruits and green vegetables in particular), the whole making up about 3 liters of water, of which about $1\frac{1}{2}$ to $1\frac{3}{4}$ liters will have to pass out with the urine.

In some instances it may be advisable to add a supplementary 200 to 500 c.c. (1 pint) of diuretic mineral waters of the type of Évian, Martigny, Contrexéville, Vittel, Royat, etc., to be taken either on an empty stomach or during the course of the morning.

In these cases judiciously applied water cures at resorts such as those just mentioned are of great benefit, effecting a species of wholesome lixiviation of the blood with elimination of the undesirable substances with the urine.

(c) **Systematic but intermittent administration of uricolytic agents** such as the lithium salts, piperazin, lycetol, thyminic acid, etc., is nearly always indicated and may well be combined with the hydriatic cures already alluded to.

Administration of organic iodine preparations or of the iodides may be of the greatest service.

Systematic purgation and even occasional Guelpa treatments (restriction to water combined with purgation) are often of great value.

It will be well, as in all other chronic disturbances and prolonged courses of drug treatment, to alternate the remedies used and institute a cyclic system of medication, as illustrated in the following outline:

One month out of every two or three, the following course of treatment is to be ordered:

(a) *For the first ten days*, the patient is to take in the course of the morning 200 to 400 cubic centimeters (6 to 12 ounces) of some water of low mineral content (such as the waters enumerated above) and two tablets of *solurol* (thyminic acid) of 0.25 gram (4 grains) each.

(b) *For the next ten days*, he is to take just before breakfast and dinner 0.25 gram (4 grains) of *potassium* or *sodium iodide*.

(c) *For the final ten days*, he takes between 10 A.M. and 4 P.M., along with 200 to 250 cubic centimeters (6 to 8 ounces) of water of low mineral content, one of the following cachets:

℞ Sodii benzoatis	0.2 gram (gr. iij) ;
Lithii benzoatis	0.3 gram (gr. v) ;
Theobrominæ sodio-salicylatis	0.5 gram (gr. viiiss)
Pone in cachet. No. i. Da tal. No. xx.	

(d) A lasting cure of obesity is obtained only by making athletes out of the patients. This proposition is strictly applicable to the group of high-pressure cases now under consideration. **Daily physical training, methodical reeducation of the muscular system and systematic sporting activities** are the necessary complement of dietetic treatment and are indispensable if a lasting recovery is to be obtained. Every list of instructions issued to such high pressure cases *must* include definite directions for physical training, the details of which unfortunately cannot be given here. (Heckel's monographs entitled "*Grandes et petites obésités*" and "*Culture physique et cures d'exercice*" cover this subject fully.)

The muscular activity should, as much as possible, be complete, *i.e.*, combine natural forms of exercise which will bring into play and develop all the muscles of the body. Walking, running, jumping, the lifting and throwing of weights, rope climbing, swimming and diving are the main features of such a system; they should be combined and quantitatively regulated while taking into account the physiologic capacities of the individual and his customary living conditions. The attempt should be made to have him at least do all that is *possible* through the course of the year and the *complete* training at certain periods. In my opinion, there is no doubt that *systematic, comprehensive courses of myotherapy* are just as necessary as the *courses of hydrotherapeutic treatment*, with which, indeed, they may be satisfactorily combined.

In these cases the cold and brief, stimulating modalities of hydrotherapy (douches), in conjunction with general rubs, are more particularly indicated. This thorough cleansing of the skin surface every day is essential.

The last measure to be mentioned is regular monthly or fortnightly *purgation* by means of a good-sized dose of a saline or vegetable cathartic. This constitutes, along with *blood-letting*, one of the best depletive measures I know of.

If the patient is not too averse to it, one may even intersperse in the treatment with much advantage a few periods of restriction to water in conjunction with repeated purgation (Guelpa's treatment). This sometimes yields remarkable results in obese, gouty or diabetic subjects.

SLOW PULSE (BRADYCARDIA).

[βραδύς, *slow*; καρδία, *heart*;
slowing of the heart.]

(See also *Arrhythmia* and the *Introduction*.)

From the standpoint of treatment, the cases of **bradycardia** may be divided into those:

1. Due to auriculoventricular dissociation, often of syphilitic origin.
2. Due to endogenous intoxication (jaundice, uremia).
3. Due to exogenous intoxication (digitalis, strophanthus).
4. Due to nervous exhaustion (depression, fatigue, shock, neurasthenia, etc.).

Bradycardia due to Auriculoventricular Dissociation.—Treat the cause:

Syphilis, generally by specific treatment.

Acute rheumatism, by sodium salicylate.

Infectious diseases, by measures appropriate for antagonizing infection.

Functional insufficiency of the bundle of His should be treated with *adrenalin*.

The *paroxysmal attacks* should be treated with the diffusible stimulants: Alcohol, ether, ammonium acetate, camphor in oil, and caffeine.

Bradycardia due to Toxic Factors and Nervous Exhaustion.—Treat the cause:

Cholemia and jaundice: Alkalies, sodium sulphate, calomel, hepatic organotherapy, etc.

Uremia: Low nitrogen diet, blood-letting, purgatives and diuretics.

Infection: Suitable measures for infection.

Overwork and worry: Rest, rational planning of mode of life, and psychotherapy.

Habitual nervous exhaustion to be treated, according to the case, by:

Strychnine, adrenalin (except where the blood-pressure is high).

Nerve tonics, especially phosphorus derivatives.

Belladonna, sometimes exerting a favorable effect.

SORE THROAT (ANGINA).

[Angina, *from* angere,
to suffocate.]

TREATMENT OF ACUTE SORE THROAT.

By G. LAURENS, M.D.

A. RED THROATS (red angina).—These consist of the erythematous, catarrhal forms of tonsillitis, without exudation, pultaceous deposits or pseudo-membranes.

The physician should keep in mind that whenever a *child* has fever, the throat must be examined every day until the cause of the temperature has become apparent.

There should be prescribed:

A symptomatic **constitutional treatment**, according to existing indications: Purgation, quinine, and a light, liquid diet.

Gargling with *very hot, alkaline fluids* at hourly intervals; this exerts an emollient effect and allays pain.

Following are a few formulas:

℞ Sodii benzoatis 10 grams (3iiss);
Glycerini 40 c.c. (f3x);
Decocti altheæ 150 c.c. (f3v).

M. Sig.: One tablespoonful in a glass of hot water.

℞ Sodii salicylatis 20 grams (3v).

Ft. chart. No. xx.

Sig.: Dissolve one powder in a glass of hot water. Gargle every hour.

A decoction of barley or althea sweetened with honey could also be used.

As soon as the inflammation has lost some of its intensity, slightly astringent preparations may be resorted to:

℞ Sodii boratis 4 grams (5j);
Tincturæ benzoini 10 c.c. (f3iiss);
Syrupi rubi (N.F.) 40 c.c. (f3x);
Aquæ 200 c.c. (f3iiiss).

M. Sig.: Use as a gargle.

In this stage likewise the patient derives appreciable relief from a **collutorium**, to be applied to the gums and other mucous surfaces of the mouth. The most effective is the borax collutorium, after the application of which a definite sense of relief is experienced.

℞ Sodii boratis	4 grams (3j);
Glycerini	24 c.c. (f3vj).—S.

In *children* either alkaline *irrigations* of the mouth with the fountain syringe, or the collutorium, may be used.

The physician will also be called upon, aside from the acute attacks, to recommend a *preventive* treatment against **recurrence** for those subject to repeated attacks of tonsillitis. Under these circumstances the patient will nearly always be suffering from a chronic tonsillar infection demanding local treatment of the crypts (such as morcellation or discission) or, if the crypts are not involved, a less powerful but more continuous local disinfection, *e.g.*, by:

Collutoria containing iodine, to be applied over the tonsils daily:

℞ Iodi	0.3 gram (gr. v);
Potassii iodidi	2 grams (3ss);
Glycerini	24 c.c. (f3vj).—S.

Sulphur preparations may be given internally for three successive months with intermissions. A sulphur mineral water, if obtainable, may be taken every morning, mixed with milk, on an empty stomach, and also used for gargling.

B. WHITE THROATS, WITH PSEUDO-MEMBRANES.—

The indications are to allay the dysphagia and to promote elimination of the exudate and pseudo-membranes.

The measures to be prescribed comprise: Hot alkaline gargles; irrigations of the pharynx with the fountain syringe, using hot, alkaline or emollient fluids containing 1 per cent. of chloral hydrate, to be repeated frequently during the day; applications of tincture of iodine or of full strength hydrogen peroxide solution.

A throat culture should be taken. If the condition of the throat is at all suggestive of diphtheria, **diphtheria antitoxin** should be injected without waiting for the result of the culture. (For the technic, see *Diphtheria*.)

The treatment of Vincent's angina is rather different. A *local antiseptic* is required. Potassium chlorate and phenol have been recommended in collutoria, and especially, local applications of methylene blue, which yields particular success. Application of powdered arspenamin to the surface of the ulcerations has given excellent results (see *Arsphenamin*).

In most instances, Vincent's angina is met with in patients whose mouths are in poor condition, showing snags, inflamed gums and dental caries. Strict oral cleanliness must be insisted on in these cases [and any needed dental work advised].

In the treatment of sore throat in general, *one should avoid:*

Using *strongly antiseptic* solutions, which are more or less toxic, in irrigations.

Making forcible attempts to detach false membranes from the pharynx; such a procedure entails risk of injury to the mucous membrane, which would open the way to secondary infections.

ABSCESS OF THE PHARYNX.

The four points at which abscesses of the pharynx occur are shown in Fig. 254.

1. **TONSILLAR ABSCESS.**—The succeeding cuts illustrate the various situations in which tonsillar abscesses are encountered.

A. **Clinical Manifestations.**—In some cases the *constitutional* symptoms—fever, lassitude and malaise—dominate the clinical picture at

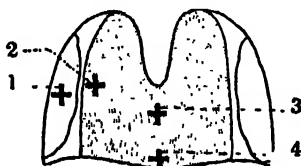


Fig. 254.—The different location of abscesses of the pharynx.

1. Tonsillar abscess.—2. Lateral pharyngeal abscess.—3. Retropharyngeal abscess (children).—4. Abscess of the base of the tongue (lingual tonsil).

first. In others they are much less marked and the local evidences predominate. The patient complains of sharp *local* pain, which gets worse and becomes very severe in swallowing movements. Feeding, even with liquids, becomes impossible. After a few days the patient suffers from *trismus* and cannot open his mouth. The voice is obtunded and nasal, and the breath malodorous. The saliva dribbles from the corners of the mouth.

B. **Distinguishing Features.**—A **pretonsillar abscess** (by far the commonest form) is manifested in a huge, lateral bulging of the soft palate, with edema and infiltration of the anterior pillar, which is red and convex anteriorly. The uvula is edematous, the tonsil pushed back, and the isthmus of the pharynx asymmetric. In this form **trismus** (due to contraction of the muscles of mastication) and dysphagia are the outstanding features.

A **post-tonsillar abscess** is recognized by the presence of a pronounced **edema** of the posterior pillar, contrasting with the normal condition of the tonsil and often of the soft palate: This edematous

area appears as a long column with a gelatinous aspect, similar to the swim-bladder of a fish. In this condition **dysphagia is extreme** and **trismus** is often wanting.

REGARDING THE COURSE OF THE DISEASE:

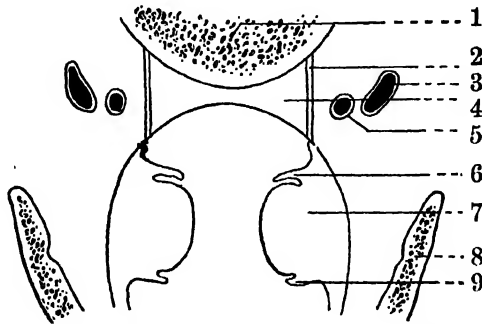


Fig. 255.—Diagrammatic horizontal cross-section of the pharynx.

1. Spinal column.—2. Lateral pharyngeal fascia.—3. Jugular vein.—4. Prevertebral space.—5. Carotid artery.—6. Posterior pillar.—7. Tonsil.—8. Inferior maxillary bone.—9. Anterior pillar.

It should be remembered that the purulent collection is generally formed in the period extending from the third to the fifth day, and that **spontaneous rupture** of the abscess may not take place until

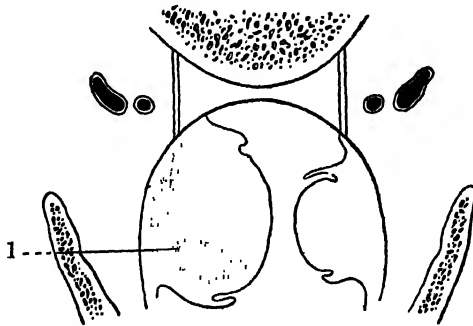


Fig. 256.—Tonsillar abscess, anterior and pretonsillar.—1. Location of the pus.

about the tenth day, through or in front of the tonsil, and that such evacuation is followed by immediate subjective relief. Sometimes complete *recovery* follows; at other times a slowly discharging focus of infection remains, and a **chronic abscess of the tonsil with sinus formation** is produced; in other cases still, the abscesses *recur*.

Complications of a septicemic type, or involving viscera, or a phlebitis of the jugular vein have been reported, which may result in death; hence the need of proper treatment of any tonsillar suppuration by the practitioner.

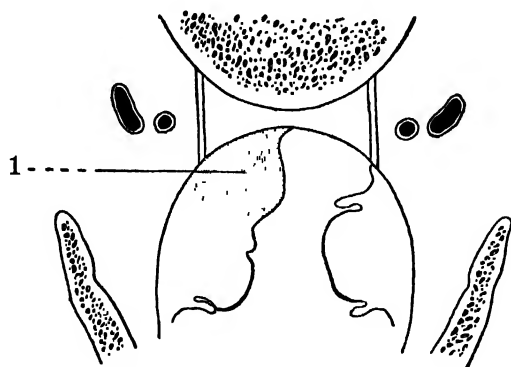


Fig. 257.—Post-tonsillar abscess.—
1. Location of the pus.

C. Treatment.—I. THINGS TO BE AVOIDED.—*a. Certain Therapeutic Practices.*—Prescribing *emetics* and *leeching* in this condition are obsolete measures which should not be used. Supposedly anesthetic *collutoria*,

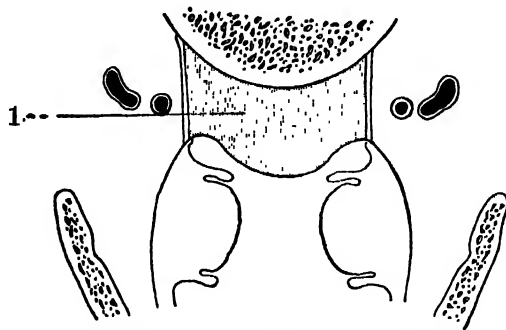


Fig. 258.—Retropharyngeal abscess.—
1. Location of the pus.

remedial applications, etc., have brought relief to very few patients, but their multiplicity has often enabled the afflicted individuals to be patient until the time for spontaneous relief is at hand. As for *gargles*, the whole motley series of them is made use of, including emollients, local sedatives, astringents and antiseptics; frequently, indeed, they are called for by the patient to make the abscess "ripen." Their

efficacy is *nil* and their use sometimes impossible, as they cause sharp pain and increase the dysphagia.

b. Abstaining from Operation Too Long.—The fear of injuring the carotid artery is not the foundation of therapeutic wisdom in this connection. One must not, because of the fact that the region is a vascular one, the pus often deeply embedded, and puncture sometimes negative, practice systematic abstention from operation and open the abscess only when the pus has practically reached the surface. Many tonsillar abscesses open spontaneously, but after how many days? Six, eight, sometimes ten, and after causing untold suffering! Again, how many serious complications have been due to the do-nothing policy!

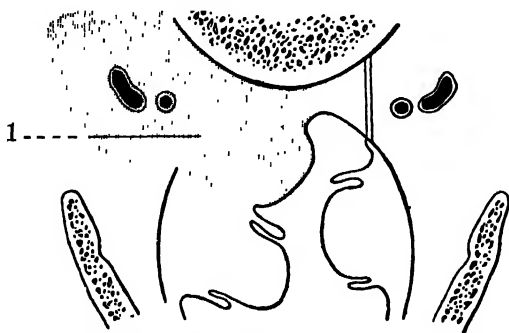


Fig. 259.—Lateral pharyngeal abscess. The pus (1) sometimes surrounds the vessels of the neck.

II. THINGS TO BE DONE.

1. *Relieve the pain.*

2. *Open the abscess* when the pus has formed.

1. **Relief of the pain.**—This is the main indication in the first two or three days.

The physician should, therefore, order the continuous application of **hot moist compresses** about the neck, and the *ingestion of ice* by the mouth. Ice acts remarkably as an anesthetic in allaying dysphagia. The food should be liquid and ice-cold. **Syphon** treatments of the throat with Seltzer water are to be recommended; the patient is thus afforded a sensation of freshness and acidity which to some extent allays his burning thirst. In addition, such syphon treatments act well in dissolving the mucous discharges and secretions that fill the entire back of the throat. They should be alternated with copious douches and **irrigations** of the mouth with alkaline, very hot fluids, carried out with a fountain syringe and under moderate pressure. Opium may be given internally.

These measures will enable the physician to pursue an expectant policy until the pus has formed.

2. **Evacuation of the abscess.**—*When? Where? How?* These are the three questions which the practitioner has to decide.

A. **WHEN?** The incision should be made when the pus has gathered. Suppuration will be recognized to have set in from certain pathognomonic symptoms which appear three, four or five days after the beginning of the illness, as we have already seen. In general, it may be stated that pus will be found as soon as *edema* is present: This is the most important sign of its presence.

B. **WHERE SHALL THE INCISION BE MADE?**—The actual topographic features of the abscess point to the course to be followed by the knife. Anteriorly situated abscesses should be incised either through the

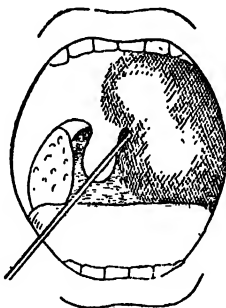


Fig. 260.—Opening an anterior tonsillar abscess with a hook or bent grooved director introduced in the upper portion of the swelling, between the pillar and the tonsil. The tissues should be opened from above downward.

anterior pillar or, rather, by working a hook in between this pillar and the tonsil. Post-tonsillar abscesses should be evacuated through a puncture made behind the tonsil, through the posterior pillar.

C. **HOW SHALL THE INCISION BE MADE?**—Attempts to *anesthetize* the area with a strong solution of cocaine, even 10 per cent., are doomed to disappointment; inflamed tissues do not respond to cocaine well. Speed of operation is the best anesthetic. Local application of Bonain's mixture may, however, mitigate the pain somewhat:

℞ Cocainæ hydrochloridi,	} partes æquales.
Mentholi,	
Phenolis	

It is well, in addition, to inject 1 cubic centimeter (16 minims) of the following solution into the middle of the inflamed area:

℞ Procainæ hydrochloridi	0.02 gram (gr. ⅓);
Liquoris epinephrinæ hydrochloridi	gtt. iij;
Aquæ destillatæ	℥ c.c. (℥xvj).

The *instruments* required comprise a scalpel, curved or Kocher forceps, a grooved director, and a tongue-depressor or spoon.

The *technic* varies according to whether the abscess is **pre-** or **post-**tonsillar. In the former type there are two ways of opening the abscess, *discission* (Figs. 260 and 261) and *incision* (Fig. 262).

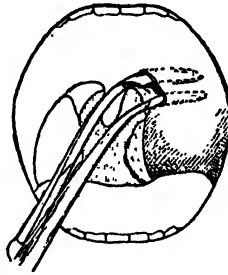


Fig. 261.—Opening an anterior tonsillar abscess with curved forceps.

In the **post-**tonsillar type, an incision is made through the thickness of the posterior pillar, from before backward, but without inclining outward, as the possibility of an anomalous ascending pharyngeal artery has always to be taken into account in this region.

EVACUATION.—The abscess having been opened, it must be almost

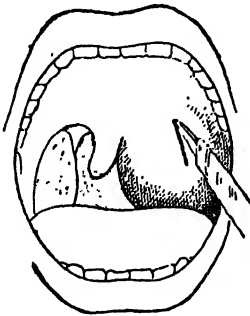


Fig. 262.—Incision of a pretonsillar abscess with the knife.

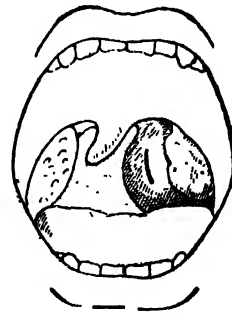


Fig. 263.—Incision of a posttonsillar abscess.

This must be done if an opening through the supratonsillar recess with the bent hook fails to reach the suppurative focus.

To avoid going astray and meeting the vessels of the neck, imagine a line drawn from the base of the uvula to the last upper molar tooth. Thus guided, open the swelling holdly through the soft palate, vertically and to a depth of 1 to 1½ centimeters ($\frac{3}{8}$ to $\frac{1}{2}$ inch). Do not simply make punctures, but make a definite, deep incision; cut straight ahead, from before backwards, but with the knife-point tending slightly inwards. If pus fails to appear, take the grooved director and dilacerate the tissues.

completely emptied. For this purpose, the margins of the wound are retracted with a pair of forceps, by spreading apart the jaws of the latter. A satisfactory, but very painful method consists in winding some cotton, dipped in neutralized hydrogen peroxide solution, on forceps, inserting it into the abscess cavity and swabbing it out. If the patient is willing to stand this, recovery follows rapidly. A few hours later, not a drop of pus will be found.

HEMORRHAGE.—This results from the incision of the infiltrated and engorged tissues. It is rarely serious. The patient should be given pieces of ice to suck continuously.

AFTER-CARE.—Before making his departure the operator should leave the following instructions:

"1. Patient to gargle every hour with a glass of hot boiled water to which have been added two teaspoonfuls of neutralized hydrogen peroxide solution.

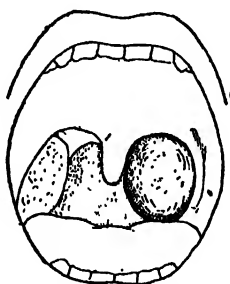


Fig. 264.—Abscess of the tonsillar parenchyma (uncommon).

"2. To be continued three times daily: Irrigations of the mouth and throat douches with the fountain syringe containing 1 liter (quart) of hot boiled water to which has been added one dessert-spoonful of sodium bicarbonate—to cleanse the oral cavity.

"3. A saline purgative to be taken on the day after the operation, for the purpose of ridding the digestive tract of the pus and toxic products that have passed into it.

"4. Liquid or semi-liquid diet to be continued for one day more.

"5. After recovery, all acute inflammation having subsided, and in order to prevent recurrence, tonsils to receive treatment if necessary."

2. RETROPHARYNGEAL ABSCESS.—The following may be stated as a **clinical rule**: *An undiagnosed and unincised retropharyngeal abscess kills the child; nearly all cases properly treated recover.*

This form of abscess develops in the posterior wall of the pharynx and is secondary to diseased lymph-glands, which subside as growth

of the child takes place. Retropharyngeal abscess is thus an affection of early childhood, especially *infancy*.

A. **Diagnosis.**—Generally, the constitutional symptoms of this condition make their appearance after a cold in the head. Fever is observed, and very soon there is marked **dysphagia**; the child refuses

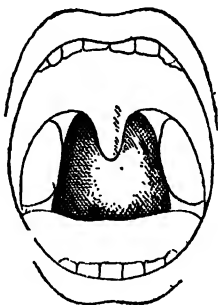


Fig. 265.—Retropharyngeal abscess.

The entire posterior wall of the pharynx is elevated into a marked protrusion in the back of the throat.

the breast and screams at its first attempts to suck. Soon **respiratory disturbances** appear, with wheezing and supranubrial recession during inspiration, and even attacks of suffocation. The voice has a nasal quality.

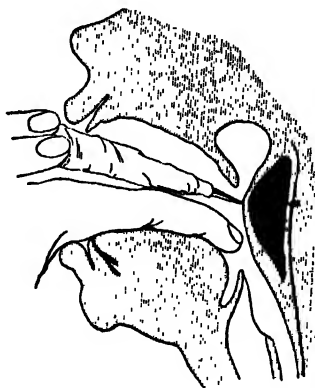


Fig. 266.—Incision of a retropharyngeal abscess.

Upon *inspection of the throat*, the posterior wall of the pharynx is found to be elevated *en masse* as a smooth tumor protruding in the throat. **Palpation of the pharynx** elicits distinct fluctuation.

B. **Treatment.**—*Always open the abscess fearlessly and without delay.*

No medical treatment.

The child is wrapped up and laid on a table, with the head hanging over the side, and firmly held by an assistant. No anesthesia

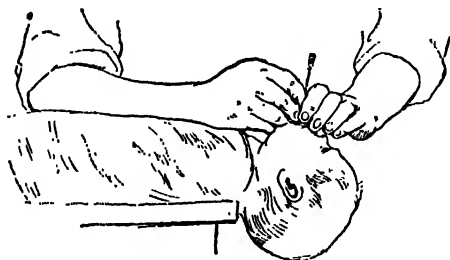


Fig. 267.—Position of the child in the opening of a retropharyngeal abscess.

and no mouth-gag. Instruments used: A tongue-depressor or simply the operator's forefinger, a grooved director or long, narrow scalpel with part of the blade covered with a little cotton or adhesive plaster.

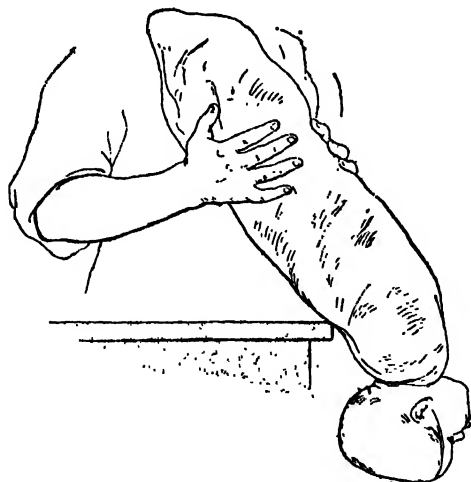


Fig. 268.—Posture immediately after the opening of the abscess.

After one stab of the scalpel or grooved director in the midline, deeply and from below upward, the pus spurts out. Quickly the assistant turns the child head down and feet up, and the pus runs out. Unless this maneuver is carried out rapidly, the child may die at once of *asphyxia* due to a flooding of the air-passages with the pus, or later develop a secondary *septic bronchopneumonia*.

If *syncope* occurs, due to spasm of the glottis, the head should be kept low, and flagellations of the chest and rhythmic traction on the tongue carried out.

No trouble from *hemorrhage* need be apprehended if the blade of the scalpel remained in the median line.

A purge should be given the next day, to clean out the digestive tract.

3. ABSCESS OF THE BASE OF THE TONGUE.—This condition should be looked for in any patient exhibiting constitutional symptoms, with **dysphagia**, muffled voice, great difficulty in the articulation of words and **almost complete inability to move or put out the tongue**, the base of which is immobilized by the inflammation. Often, indeed, there is difficulty in breathing.

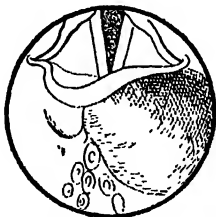


Fig. 269.—Abscess of the lingual tonsil.

The contact of the tongue-depressor proves very painful. Pharyngoscopy is negative. If the tongue can be pulled out, a laryngeal mirror will reveal at its base, in front of the epiglottis, a smooth, red tumefaction, representing the abscess at the base of the tongue.

A laryngologist should be called in to incise the abscess with special instruments.

CHRONIC OR RECURRING SUBACUTE SORE THROAT.

Such a condition should be treated energetically and persistently, not only because it is unpleasant in itself but because it is a perpetual source of a great variety of complicating toxic and infectious disturbances. The best course to follow, according to Lermoyez, is this:

Medical Treatment.

(a) Daily application of efficient bactericidal agents (iodine-glycerin, salol and camphor, etc.) to the diseased areas.

(b) Frequent gargling, morning and evening and after meals, with the following non-toxic solutions, which do not harm the dental enamel:

Benzoic acid, 0.25 per cent.; salicylic acid, 0.2 per cent.; thymol, 1:3000.

(c) Nasal irrigations twice daily with warm solutions, alternated to avoid habituation: Sodium salicylate, 1 per cent.; resorcinol, 2 per cent.; boric acid, 3 per cent.

This simple palliative treatment is, however, not enough. "The depths of the crypts, actual germ incubators in which tonsillitis starts, escape it entirely."

Surgical Treatment.

Tonsillectomy, if the tonsils are large and prominent.

Cauterization with the thermo- or galvano-cautery. This procedure is hardly to be recommended, in view of the severe reaction it induces and the fibrotic changes it results in, which "lock the wolf in with the sheep."

Dissection.—This procedure consists in tearing asunder with a hook, under cocaine anesthesia if need be, the bridges of tonsillar tissue which separate the crypts. The pain is trifling, bleeding slight, and efficacy high. Two or three sittings generally suffice.

VINCENT'S ANGINA.

This condition, as is well known, is characterized mainly by a chancre-like ulceration on one tonsil extending to the angle of the jaw, a foul odor, submaxillary glandular enlargement, and numerous fusiform bacilli and spirochetes in smears of the exudate.

Local Treatment.

(a) Frequent gargling—morning and evening and after meals. Pressure irrigations with the fountain syringe, at least morning and evening.

(b) Application or swabbing once or twice daily with cotton dipped in *glycerin* and dusted with *arsphenamin*.

(If *arsphenamin* is not obtainable, methylene blue, 10 per cent. silver nitrate solution or 10 per cent. hectin solution may be employed.)

General Treatment.

In serious, refractory cases an intravenous injection of *neoarsphenamin*, 0.3 to 0.45 gram, should be unhesitatingly given.

Hygienic Instructions.

Liquid diet; milk and milk products preferably.

Free airing and ventilation of the room.

Very careful disinfection of all articles with which the patient has come in contact—linen, handkerchiefs, etc.

Isolation.

TREMOR.

[Tremulare, to tremble.]

Regarding the treatment of **tremor** as such there is little to say.

Accidental (transitory) tremor, due, *e.g.*, to emotion, fever, or exposure to cold, ceases when its cause passes off.

Toxic tremor yields to removal of the cause (tea, coffee, alcohol) if the intoxication has not existed for too long a time.

Hereditary, neuropathic or hysteric tremor is sometimes mitigated by the use of the *mirror method*, described by H. Meige as follows: "The patient is placed before a mirror and carries out certain systematic movements or remains motionless. The mirror is a faultless, inexorable teacher; it allows no faulty movement to pass unperceived. The mistaken conceptions which the patient has of his peculiar postures or gestures are always immediately illuminated by the sight of his own picture; he learns to correct his deficiencies much more quickly. He gets accustomed to correcting himself before the mirror first of all; gradually such correction is more and more easily effected. He then tries to repeat the correcting movements without the assistance of the mirror. The habit he has formed facilitates this task for him and improvement is thereby greatly enhanced."

All the procedures and drugs recommended for the treatment of this variety of tremor—hydrotherapy, static baths, high frequency, valerian, bromides, various serums, organotherapy, etc.—are effective solely in proportion to the power of suggestion imparted to them by the persons who prescribe and administer them.

In the *tremor of organic diseases of the nervous system*, hypodermic injections of *scopolamine hydrobromide* in doses of 0.00025 to 0.001 gram ($\frac{1}{260}$ to $\frac{1}{65}$ grain) have given favorable results in paralysis agitans, disseminated sclerosis and senile tremor.

"One-half hour after the injection the tremor and rigidity become attenuated and a marked subjective feeling of improvement sets in which lasts from twelve to twenty-four hours. To continue the effect, however, the drug will then have to be repeated. The signs of intoxication to be watched for very carefully are dryness of the mouth and a heavy feeling in the head. The drug must be intermitted from time to time in order to prevent habituation and the appearance of more serious manifestations of poisoning, *viz.*, dizziness, prostration, and

clouding of consciousness. As substitutes for scopolamine—less effective though quite as toxic—one might prescribe hyoscyamine, duboisine sulphate or atropine. The alkaloid of Calabar bean, eserine, is not a harmless substance; its use must be stopped as soon as headache, dizziness, sweating, salivation, myosis and slow pulse-rate appear" (Souques).

Phenobarbital (luminal) has given inconstant results in daily amounts of 0.1 to 0.2 gram ($1\frac{1}{2}$ to 3 grains). Its use is not free of drawbacks.

On the whole, the treatment of tremor merges with that of its cause.

* * *

A brief account of the treatment of **infantile chorea** (simple chorea, Sydenham's chorea, St. Vitus's dance) will now be given.

This appears to be dependent on three factors:

1. *Predisposing factor*: Neurotic heredity (alcoholism, gout, neuropathic degenerative states).

2. *Exciting factor*:

- (a) Most frequently, *infection* in childhood, often rheumatic.

- (b) Sometimes a fright, traumatism or the sight of a similar case.

3. *Associated factor*: Ovarian or testicular insufficiency, thyroid disturbance.

The natural course of events is for chorea to undergo *spontaneous regression* until recovery has occurred. It is therefore not necessary to attempt forceful methods of treatment.

General Hygienic Recommendations.—*Milk diet*, either continuously for a period of a few days to several weeks, especially during periods of excitement, or intermittently (one or two days in each week). In any case, the diet should be one of low toxicity and low in chlorides, chiefly *milk*, *vegetables* and *fruit*, with eggs and meats only in great moderation, and without any stimulating foods. Impairment of nutrition in the process should, however, be guarded against.

Absolute rest in bed, isolation during the paroxysmal periods, combined with Swedish gymnastics, then a gradual return to outdoor life, exercise and mental distractions, all exciting pursuits being, however, avoided.

Hydrotherapy, cautious, gradual and systematic. Lukewarm, then cold sponge baths; wet packs, showers, jet-douches, at first tepid, then cold; rubs and packs. In short, a progressive course of hydrotherapy.

Low elevations and wooded regions are much better for these cases than mountain resorts at a moderate elevation (below 800

meters—1300 feet), and mountain resorts are usually preferable to the seashore.

Among the **drugs** which have been tried, only the following have been of service and are worth remembering: Sodium salicylate, the antispasmodics, antipyrin, chloral hydrate, and the arsenic compounds.

Sodium salicylate, recommended particularly during the period when chorea was deemed to be always of rheumatic origin, is still considered almost a specific by a few observers. As a matter of fact, no such specific remedy for the condition exists. Favorable results are, however, to be confidently expected in some cases. The daily dose should be 2 to 4 grams ($\frac{1}{2}$ to 1 dram) in four divided amounts, combined with an equal quantity of *sodium bicarbonate*.

The *antispasmodics*—*valerian* and the *bromides*—are plainly of great value during the periods of excessive excitability.

The same is true of *antipyrin* and of *chloral hydrate*. Antipyrin undoubtedly exerts a pronounced effect on the paroxysms in a daily dosage of 1 to 2 grams (15 to 30 grains). It may very readily be combined with sodium salicylate and sodium bicarbonate. It is one of the drugs which yield the highest percentage of recoveries. Chloral hydrate should be reserved for the cases of sleeplessness with nocturnal seizures. If need be, it may be combined with the bromides.

The *arsenicals* have been a standard remedy in chorea since the time of Dioscorides. Their actual efficacy remains quite open to question as regards the seizures themselves. Their effects on general nutrition and anemia cannot but be favorable, however, in these little nervous patients. The use of *arsphenamin* is warranted where specific infection is known or suspected to exist. Otherwise, one may prescribe either *Fowler's solution*, *arsenic trioxide* pills, or injections of *sodium cacodylate*.

Arsenic should be used in doses sufficiently large to be effective.

Arsenical butter has the advantage of causing no toxic effects and gives results similar to those obtained from arsenical solutions. The arsenic trioxide is mixed with 10 grams of butter, which is spread on bread. This is eaten either in the middle or at the end of a meal, once daily. (It should not be taken on an empty stomach.) With this measure it is not necessary to put the child to bed nor on a milk diet.

Arsenic trioxide is given in doses of 0.005 gram ($\frac{1}{2}$ grain) to begin with, increased by 0.005 gram a day up to the maximum amount of 0.04 gram ($\frac{2}{3}$ grain); this dose is maintained for a few days, then reduced by 0.005 gram daily down to *nil*.

As for the really aggressive measures, such as **lumbar puncture** and **subarachnoid injections of magnesium sulphate**, these are warranted

only in the presence of **particularly serious and refractory manifestations**, with evidences of probable spinal hypertension. For suggestive and documentary reasons alone, mention may be made of the contribution of the English observers, Alan Brown, Smith and Gordon Phillips, who recommended *intraspinal autoserotherapy* in chorea.

In any event, it would be rational to precede these measures by *subcutaneous* or *intramuscular injections of magnesium sulphate*—2 cubic centimeters (32 minims) of a 20 per cent. solution, to be renewed two or three times in the twenty-four hours. More concentrated solutions are capable of causing pain, and a few cases of local necrosis have been reported. The approximate daily dose should be 1 gram (15 grains). This procedure is to be reserved for the serious cases, in which the intense motor activity constitutes an actual danger by interfering with sleep and the taking of food.

Thyroid extract might also be tried. In these cases such medication must be handled with particular care.

VERTIGO.

[*Vertere, to turn; agere, to make;*
a state that makes one turn.]

BY ANDRÉ LUTIER, M.D.

First of all the cause must be looked for and all organs of the body investigated in turn.

Aural Vertigo.—This is the commonest form. In a case of vertigo one should always examine the ear or seek the advice of a specialist, even if an evident cause is thought to have been found in the stomach or some other organ.

Any lesion of the ear (external, middle, internal, auditory meatus, tympanic membrane, tympanum, *e.g.*, the common wax in the ear, suppurative otitis, etc.) is capable of inducing vertigo with deafness and tinnitus.

The intervention of the specialist will often result in disappearance of the vertigo (by removal of impacted cerumen or of a foreign body, or insufflation of air with the Politzer bag if the middle ear is involved).

In the event of concussion of the labyrinth, the patient should stay at rest in bed, in absolute silence. A purge should be given, ice applied to the temporal region, and two or three leeches may be placed over the mastoid.

In a case of **Ménière's disease** (irritation of the labyrinth from whatever cause, characterized by vertigo, deafness, and tinnitus) **quinine sulphate in large doses** may be prescribed, *e.g.*, for two weeks, before each meal, 0.5 gram ($7\frac{1}{2}$ grains) of quinine sulphate in a cachet. This is to be discontinued for the next two weeks, then resumed.

After four or five such periods the vertigo often disappears.

The patient should stay in bed, since often the attacks of vertigo with falling of the patient to the floor show a marked increase of frequency during the first few days of the treatment. Furthermore, the patient must stay on a milk diet, to increase the tolerance of the stomach for quinine.

If the drug is badly borne by the stomach, a soluble salt of quinine should be given by enema or subcutaneous injection.

As a substitute for quinine sulphate, Charcot prescribed **sodium salicylate** in arthritics in doses of 2 or 3 grams (30 to 45 grains) a day.

Quinine sulphate in large doses is now hardly ever used any more, as it is accused of causing grave lesions of the cochlear and vestibular nerves and of increasing deafness.

Pilocarpine is rather useful, but is toxic. For a week a daily subcutaneous injection of 0.5 c.c. (8 minims) of a 1 per cent. solution of pilocarpine hydrochloride may be given, or the same dose prescribed by the mouth.

Potassium bromide (1 to 2 grams—15 to 30 grains—a day) is often successful.

In many cases of ill-defined vertigo (pseudo-Ménière vertigo, incomplete vertigo with mere temporary giddiness, and the vertigo *a stomacho leso*, often so called without any evident proof, etc.), **adrenalin** (6 to 20 drops by mouth daily for ten days; to be stopped and then resumed) gives good results. Sometimes it is well to complete its action with pilocarpine.

Lumbar puncture has been recommended by Babinski. From 15 to 20 cubic centimeters of cerebrospinal fluid are withdrawn. If necessary, another puncture is carried out a few days later. Sometimes puncture is repeated every few weeks. Most patients are improved as regards the vertigo, but not as regards the tinnitus. Very often, on the day following a puncture, the vertigo and deafness have already diminished.

To be added to the foregoing measures are:

Hygienic and dietetic instructions: Rest in bed in silence and darkness; an appropriate antidyspeptic diet if gastric disturbances have been found, or a pressure-lowering, diuretic diet if high blood-pressure has been found; a nitrogen-low diet, etc.; no alcohol, tobacco, nor coffee.

Drastic purgation: Tincture of jalap, etc.

Leeches over the mastoid.

Mustard plasters to the legs.

In the presence of syphilitic labyrinthitis, mercury cyanide intravenously in large doses should be employed, or mercury benzoate. (The arsphenamins are to be avoided, as they may cause deafness.) Bismuth may be tried.

Ocular Vertigo.—Diplopia causes vertigo. If syphilis is the cause, mercury cyanide in high dosage should be injected, or bismuth salts used (arsphenamins to be avoided).

In any event, a ground glass worn over the affected eye will cause the vertigo to disappear.

Vertigo in Arteriosclerotics (vertigo on getting out of bed; often brought on by postural changes): A milk and vegetable diet, iodides

in small doses, and purgatives. Venesection or leeches in the event of a notably high blood-pressure. Pilocarpine sometimes proves of service.

Vertigo of Plethora or Congestive Arthritism: Reduction of food and drink; interdiction of alcohol; purgatives (aloe); if necessary, venesection.

The **vertigo of uremia** is due either to intoxication or cerebral edema: A detoxication cure (water or milk diet, drastic purgation, venesection) acts very favorably. Nitroglycerin and theobromine prove useful adjuncts.

The **vertigo of gout** may be due to arteriosclerosis and call for the corresponding treatment, or may be amenable to the preparations of colchicum or sodium salicylate.

The **vertigo of diabetics** is sometimes a forewarning of coma, and calls for alkalis in large doses, a milk and vegetable diet with avoidance of meat, and in particular, a course of insulin treatment.

Anemic Vertigo.—Certain very anemic persons (chronic anemia) have no vertigo; others, less anemic, suffer from it.

In acute post-hemorrhagic anemia **injections of saline solution** should be given, to be followed by **horse serum**, *e.g.*, hemostyl.

In the chronic anemias and in convalescents, **iron** and **arsenic** should be given and **rest** ordered.

Gastric vertigo is one of the commonest forms, along with aural vertigo and anemic vertigo; it is encountered particularly in nervous subjects with gastric fermentation. Coffee, liqueurs, and tobacco are to be interdicted. An anti-dyspeptic diet is to be ordered: Very little bread, and water as drink. Slow eating is to be enjoined, together with rest after meals. Warm hydrotherapy is serviceable. Constipation must be combated, *e.g.*, with aloe pills.

Vertigo in Helminthiasis.—Vermifuges.

Vertigo in Aortic Disease.—In rheumatic aortic insufficiency, the vertigo due to medullary and cerebral anemia should be combated with opiates (4 to 6 drops of laudanum), bromides, and valerates.

In aortic lesions of arterial origin, **iodide** in small doses should be given, along with the milk and vegetable diet, purgatives, aloe, etc.

Vertigo of Cardiac Cases (mitral or tricuspid insufficiency); due to passive congestion. Venesection, purgatives, diuretics, and heart tonics are to be prescribed.

Vertigo of the Menopause.—Ovarian organotherapy has little effect. One should prescribe, in addition, repeated laxatives (each morning one teaspoonful of Rochelle salts before breakfast, in a

glass of water), wet cups every month, a vegetarian diet, diuretics, rubbings, etc., since high blood-pressure plays an important rôle.

Laryngeal vertigo, caused by a preëxisting affection of the larynx or by a bulbar lesion (observed especially in tabetics). The larynx and the nervous disease are to be treated.

Vertigo of Infectious Diseases (typhoid fever, influenza, etc.). The vertigo disappears with subsidence of the disease.

Vertigo due to Poisoning (alcohol, tobacco, morphine, solanaceous plants, poison hemlock, digitalis, quinine, sodium salicylate, etc., carbon monoxide, illuminating gas). Emetics, purgatives, gastric lavage, outdoor life, etc., are indicated.

Vertigo in Diseases of the Central Nervous System: Cerebral tumors, tumors of the cerebellum, multiple sclerosis, tabes, general paralysis, etc.

In these cases syphilis should always be looked for, and, where indicated, intensive treatment given (intravenous injections of mercury cyanide, injections of bismuth salts).

Neuropathic Vertigo (neurasthenia, psychoneuroses, hysteria, epilepsy, migraine, vertigo of high places, mountain vertigo, seasickness, etc.).

Bromides.

Diet: Interdiction of meat, coffee, alcohol, and spices.

Frequent laxatives.

Warm hydrotherapy.

Psychotherapy, suggestion.

VOMITING.

[*From vomere, to vomit.*]

True **vomiting** is a reflex act taking place through a center situated in the medulla in the vicinity of the respiratory center. The afferent stimuli originate at some point in the distribution of the vagus, the glossopharyngeal, the trifacial or the cerebral cortex; of these, stimulation of the vagus (abdominal stimuli) is by far the commonest. The efferent impulses are distributed along the phrenic nerve (to the diaphragm), the vagus nerve (to the stomach) and the spinal nerves (to the abdominal muscles).

These anatomic and physiologic considerations account for the fact that vomiting may be either of central origin (meningitis, apomorphine, a revolting picture) or of peripheral origin (appendicitis, indigestion, pregnancy, tickling of the uvula).

They constitute the foundation for the rational treatment of vomiting from the standpoint of pathologic physiology; the aim in such treatment should always be to eliminate or check the causal stimulus (cocaine, chloroform water, cracked ice, etc.); to depress or insensitize the medullary center (morphine, chloral hydrate enemata, cold applications to the back of the neck, etc.); to influence in a measure the efferent paths and their terminals (belladonna, ice-bag, various forms of counterirritation, etc.). The annexed diagrammatic table summarizes and condenses the different factors involved in this pathophysiologic system of treatment.

* * *

The subject may be appropriately dealt with, it seems, by the presentation of a number of typical treatments relating to the most common forms of vomiting:

I. Treatment of the Symptom, Obstinate Vomiting.

(a) Withdrawal of all food, fluid and medicine by the mouth—a condition which may be withstood for a period of four to ten days provided thirst be allayed by mouth-washing, gargling and hypodermic injections of 0.7 per cent. salt solution.

Or, a diet of bouillon and milk, cold or iced, given in tablespoonful amounts every hour or two, followed by a pill of ice; also water, which may or may not be carbonated.

The amounts should be increased only gradually, and substantial feeding permitted only when 2 liters of fluid in twenty-four hours can be taken without nausea or vomiting.

- (b) An ice-bag or cold compress, kept continuously on the epigastrium.
- (c) Inhalations of oxygen (or hypodermic injections of the same).
- (d) An enema of 1 to 3 grams (15 to 45 grains) of chloral hydrate if there is persistent vomiting.

II. Vomiting Due to Indigestion.

(a) Removal by means of emetics or stomach-washing and purgation (or a purgative enema or intestinal irrigation) of the irritant foods that have become toxic or both toxic and the seat of bacterial infection.

(b) Restriction to water, then to a fruit diet, then to a vegetable and fruit diet, then an ordinary mixed diet, according to tolerance.

III. Vomiting in Pyloric Stenosis.—Plainly, surgical intervention is alone to be advised in such a case; but it often happens that one is compelled to institute medical treatment, the patient failing to make up his mind in favor of the operation.

The medical treatment should be planned thus:

Wash out the stomach once or twice (not more).

Place the patient on a liquid diet of milk or milk derivatives.

Favor gastric evacuation to the utmost by giving solutions with a cryoscopic concentration $\Delta=0.38$, the optimal concentration for evacuation of the stomach (see Part IV: *Diseases of the Digestive Tract*).

The following formula affords this concentration:

- | | |
|----------------------------|------------------|
| R Sodii bicarbonatis | 16 grams (½ss); |
| Sodii citratis | 4 grams (½j); |
| Lactosi | 130 grams (½iv). |
- M. Sig.: One teaspoonful in 125 cubic centimeters (3 ounces, or about one teacupful) of hot water when the pain or nausea comes on.

IV. Vomiting of Abdominal Origin (*appendicitis, peritonitis, salpingitis*, etc.).—(a) The measures given under No. I should be applied very strictly.

(b) Every two hours, one of the following pills:

- R Extracti belladonnæ,
 Extracti opiiāā 0.005 gram (gr. ½₁₂).
 Ft. pil. No. i. Da tal. No. xii.

(c) If necessary, a hypodermic injection of *morphine* or of the total opium alkaloids.

V. Hyperemesis Gravidarum.—There is much uncertainty about the treatment of this condition, which has not been thoroughly worked out. It is variously directed against the toxic condition, dyspepsia, gastroparesis, aerophagia, neurosis and hysteria.

EFFERENT MOTOR PATHS.

Counterirritation along the phrenic nerve. Diaphragm.
Wet cupping.
Ether spray.
Blistering.

Depression of the vagal terminals. Stomach.
Belladonna.
Atropine.

Counterirritation along the spine. Abdominal muscles.
Wet cupping.
Cauterizations.
Blistering.

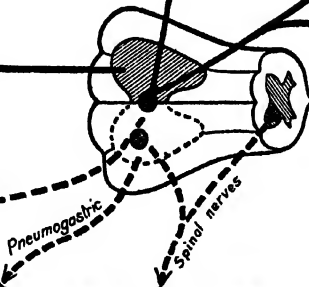
Venesection. Purgation. Restriction to water and fruits.
Venesection. Alkalies in large doses, emula.

Vomiting center in the medulla.

Oxygen inhalations.
Morphine hypodermically.
Chloral hydrate enemata.

Afferent corticobulbar paths

Phrenic nerve
Pneumogastric
Spinal nerves



AFFERENT PATHS OF STIMULATION.

Emetic toxics, tartar emetic, ipecac, apomorphine, chloroform, autotoxic materials (uremia, acetone).
Meningitides
Brain tumors
Revolving recollections or pictures. Hysteria
Seasickness
Migraine
Tubercles, Bulbar ischemia

Treatment of the cause.
Stomach washing.
Treatment of uremia.
Treatment of acetone.
Ice-bag.
Lumbar puncture.
Antiemetogenic serum.
Removal.
Lumbar puncture (?)
Suggestion. Mental distraction.
Psychotherapy.
Inhalations.
Belladonna. Atropine.

Nasopharynx.
Pharynx (adenoid vegetations).
Nasal passages (polyps, nauseous odors)

Local treatment.
Anesthetic applications: Cocaine.
Adenoidectomy.
Examination for and removal of causes.
Removal of polyps.

Stomach. Indigestion. Dyspepsia. Alcoholism. Gastritis. Ulcer. Cancer. Gastric neuroses
Intestine. Peritonium. Appendicitis. Hernia, intestinal obstruction or occlusion, peritonitis, etc.
Uterus
Hepatic colic
Renal colic

Chloroform water or menthol water.
Cocaine. Cracked ice.
If required: Emetics (in indigestion or poisonings).
External applications: Ice.
Pills: Opium, Belladonna.
Surgical intervention.
Same treatment + according to the
Appendectomy
Radical cure of hernia.
Evacuating procedures: Irrigations, anthelmintic purgation.
Replacement, operation.
In pregnancy: Chloral hydrate, diet, laxatives.
Local applications.
Injections of morphine.
Treatment of the cause.

(a) According to tolerance: Fruit diet, milk diet, milk-vegetable-fruit diet, kephyr. In the aggregate, there should be withdrawal of fats and increase of the carbohydrates (potatoes, rice, oats, vegetables and fruits). In addition, 20 to 30 grams ($\frac{2}{3}$ to 1 ounce) of milk sugar.

(b) Bowel irrigations; saline purgatives (sodium sulphate).

(c) Enemas of chloral hydrate; oxygen inhalations and injections.

(d) Hypodermic injections of physiologic salt solution.

(e) Ovarian organotherapy (?) ; ovariectomy in the presence of adnexal lesions (?)

(f) Isolation and psychotherapy.

(g) In very obstinate cases with marked impairment of nutrition, small pulse, anuria, etc., induction of labor may be imperative.

VI. Toxic Vomiting due to Exogenous Poisons (tartar emetic, ipecac, apomorphine, chloroform, ether, alcohol).—(a) Evacuation of the toxic agent. Gastric lavage, bowel irrigation, purgative enemas; diuretics (if well borne); injections of saline solution.

(b) Inhalations and hypodermic injections of oxygen.

VII. Toxic Vomiting due to Endogenous Poisons (uremia, acetonemia).

A. *Apply the treatment described under No. I* and treat the cause (see *Uremia* and *Acetonemia*).

B. The *cyclic vomiting of children* deserves special mention. It has been ascribed to acetonemia by Marfan, who advises the following treatment:

(a) *During the attacks:*

1. Complete or relative starvation; the return to ordinary feeding should be gradual.

2. Hypodermic or rectal injections of physiologic salt solution.

3. Bowel irrigations and sometimes gastric lavage.

(b) *In the intervals between attacks:*

1. A light diet.

2. Frequent use of laxatives.

3. Daily bowel irrigation.

4. R Magnesii oxidi 0.2 gram (gr. iij);
Lactosi 2 grams (5ss).

Pone in chart. No. i. Da tal. No. xxx.

Sig.: Five powders a day in a little water.

5. Sodium bicarbonate and sodium citrate may be useful.

6. Open air life. Overstrain to be avoided.

Diet.—Each case requires special directions, but there are certain general rules: 1. The child must be fed in spite of the vomiting, and the

restriction to water not persisted in too long. 2. Human milk is the best food; if lacking, one may give asses' milk or cow's milk, skimmed and with addition of a solution of sugar in water (10 per cent.), skimmed condensed milk with sugar, buttermilk or kephyr of low fat content with addition of lime water; when the child is over three months old, it may be given gruels with milk-flour or maltose. 3. Generally the number of feedings and the intervals should not be changed, but in severe forms with incessant vomiting and obstinate constipation it is well to reduce the feedings and shorten the intervals; sometimes the feeding has to be done with the medicine dropper. In the older nurslings the dry diet may be employed (Gallois). Introduction of woman's milk by the rectal route has been recommended for the refractory cases, but without very gratifying results.

VIII. Vomiting in Seasickness.—This form of vomiting appears to be dependent on bulbar ischemia. The pathogenesis of the condition is certainly complex and is not satisfactorily established (phobia of seasickness, ballottement of the abdominal organs, instability of the cerebrum and cerebellum, etc.). The multiplicity of treatments recommended reflects the uncertainty and complexity of the pathogenesis. *At all events, excitation of the vagus is obvious.*

The following preventive measures may be advised:

(a) *Psychic treatment*, generally based on the giving to the patient of some remedy (preferably pills) reputed to be particularly effective.

Many of the bizarre remedies act only by suggestion.

(b) Enhance the general tone of the individual and urge him to practice *auto-suggestion* strongly, making up his mind not to be seasick, concentrating his attention on a book or idea, etc.

(c) Recommend the wearing of a very tight *abdominal belt*.

(d) Subject to *stay recumbent, with the head low*, for as large a part of the time as possible.

(e) A small meal three hours before going on board the ship is probably to be recommended.

Abstention from all food and drink or from food alone, or the taking of only a little fruit (oranges, tangerines), is probably the best course to follow on short crossings.

On longer trips, the diet should be based, on the whole, upon individual tolerance; this accounts for the fact that every writer advises a different régime, no doubt based too subjectively on the results of his own experiences and personal varieties of intolerance. A rather dry diet, with restriction of fluids, meats in moderation, and ingestion mainly of vegetable articles and fruits, seems to be the form of diet tolerated by the largest number of persons.

(f) *Countless drugs have been recommended, with disappointing results.*

1. The "Ligue du mal de mer" (League against Seasickness) advises:

(a) A saline purge on the morning of departure.

(b) Before going on board, the taking of two or three capsules or cachets each containing 0.2 gram (3 grains) of quinine hydrochloride.

(c) During the crossing or in the event of rough weather, granules of 0.001 gram ($\frac{1}{65}$ grain) of strychnine arsenate, of which two to five are to be taken in the twenty-four hours.

2. Chloral hydrate, with or without bromides, by the mouth if practicable or by enema if not, still remains the therapeutic measure which is followed by the lowest proportion of failures. Bromidia owes its popularity partly to its relative efficacy in this disorder. A teaspoonful contains 1 gram (15 grains) each of chloral hydrate and potassium bromide and 0.01 gram ($\frac{1}{6}$ grain) each of extract of hyoscyamus and extract of cannabis. It is given by the mouth or rectum—one teaspoonful in a quarter glassful of water or other fluid.

3. *Saturated bromoform water* 100 to 200 cubic centimeters (3 to 6 ounces) a day, has been successful in a few cases.

4. In persons with a hypersthenic condition of the stomach, alkalies and bismuth could be advised.

R Calcii carbonatis præcipitati,
Magnesii carbonatis,
Bismuthi subcarbonatisââ 2 grams (3ss).

Pone in chart. No. i.

Sig.: Take in a half-glassful of water.

5. Hypodermic injections of *atropine sulphate* in doses of 0.001 to 0.002 gram ($\frac{1}{65}$ to $\frac{1}{32}$ grain) are asserted by Roger and by Cazamian to have yielded excellent results. Nolf likewise recommends 0.002 gram of atropine sulphate taken in three doses half an hour apart—the first at the time of departure.

I have, indeed, had occasion to note very favorable results in many persons for whom I had prescribed granules of 0.00025 gram ($\frac{1}{260}$ grain) of atropine sulphate, two granules to be taken fifteen minutes before departure and two to four more, fifteen minutes apart, in the event of threatening discomfort.

Patients regularly subject to seasickness were thus enabled to make even rough crossings without the least discomfort.

On one occasion I personally witnessed cessation in ten or twelve minutes of a very threatening attack of seasickness upon administration of 0.00075 gram ($\frac{1}{86}$ grain) of atropine by the mouth.

6. *Adrenalin* is said to allay seasickness in vagotonic subjects and make it worse in sympatheticonics.

IX. **Vomiting due to Disease of the Nervous System** (meningitis, tabes dorsalis, meningeal hemorrhage, brain contusion).—The treatment is precisely that of the cause (see these various conditions).

X. **Hysteric Vomiting**.—This variety is particularly obstinate and yields, as a rule, only to *isolation*, *psychotherapy*, and especially, *suggestion*.

In this group may, on the whole, be placed the cases of anorexia and vomiting before going to school, described by Guinon, generally dependent upon fear.

Suggestion may sometimes be rendered more effective by the use of certain physical agencies: Electricity, massage, high frequency.

Gavage may become necessary if the condition is very persistent.

XI. **Periodic Vomiting in Children** (adapted from Marfan).

A. PREVENTIVE TREATMENT OF THE ATTACKS.

1. *Restriction of fats* to what is absolutely necessary; fried fats to be avoided.

Restriction of lipoid-containing foods: Yolk of egg, brains, sweet-breads.

Milk to be given only in moderation.

Avoid chocolate, tea and coffee.

2. *Intermittent alkaline medication*: (a) In children of five to six years:

For ten days in each month, twice daily, one-half hour before a meal, one of the following powders in two tablespoonfuls of hot water:

℞ Sodii sulphatis	0.3 gram (gr. v);
Sodii bicarbonatis	0.2 gram (gr. iij).
Ft. chart. No. i.	

(b) In children of eight to ten years:

For ten days in each month, twice daily, one-half hour before a meal, 50 cubic centimeters (1 $\frac{7}{8}$ ounces) of the following solution:

℞ Sodii bromidi	3 grams (gr. xlv);
Sodii sulphatis	8 grams (3ij);
Sodii phosphatis	6 grams (3iiss);
Sodii bicarbonatis	4 grams (3j);
Aquæ destillatæ	1 liter (Oij).—S.

B. TREATMENT OF THE ATTACK.—The possibility of appendicitis should be excluded.

1. Every half-hour: Three or four teaspoonfuls of 20 per cent. sugar solution, cold or iced, with the addition of 0.2 to 0.5 gram (3 to 7 $\frac{1}{2}$ grains) of sodium bicarbonate.

2. Twice a day: Enemas of 150 to 300 cubic centimeters (5 to 10 ounces) of hot boiled water (40 to 50° C.—104 to 122° F.) to which has been added 1 per cent. of sodium bicarbonate.

3. If the attack continues: Injections of 25 to 100 cubic centimeters (1 to 3 ounces) of isotonic salt or glucose solution.

4. If the case is a serious one, with severe vomiting, somnolence and convulsions: Intravenous injections of 25 to 200 cubic centimeters (1 to 6 ounces) of 5 per cent. sodium bicarbonate solution; or, if this is not feasible, slow subcutaneous injections of 50 to 400 cubic centimeters (1½ to 13 ounces) of 20 per cent. solution.

5. Above all, avoid purgatives (such as calomel) and sedatives (such as chloral hydrate, morphine and bromides), which are ineffectual and dangerous.

* * *

Lastly, a word concerning the medical treatment of a vomica, *i.e.*, a sudden ejection of pus from the respiratory tract.

There is little that the physician can do in these cases.

(a) Give supporting treatment and, if necessary, administer stimulant injections of camphor in oil, ether, caffeine or sparteine.

(b) Place the patient in the best posture for favoring proper evacuation of the fluid.

(c) Allay anxiety, if possible; if need be, inject morphine or the total opium alkaloids to reduce the excitement and exhausting cough.

(d) Seek the intervention of the surgeon as soon as possible.

PART IV.

TREATMENT OF DISEASES.

In this section of the work an attempt will be made to present the general rules, as well as concrete examples, relating to the treatment of the diseases most commonly encountered by the practitioner.

The data presented in the earlier sections (on the therapeutic agencies, therapeutic procedures and the treatment of symptoms) will generally preclude the need of long descriptions in this section.

The limited space available will necessitate very concise treatment of the subjects taken up. This rule has been departed from in only a few places, where somewhat more detailed descriptions seemed, rightly or wrongly, to be absolutely necessary.

Further, the object sought has been much less to furnish a compendium, handbook or directory in which would be compiled and collated all views, even such as were contradictory, that may have been or are being held regarding all the various forms of therapy, than a presentation as substantial, rational and systematic as is possible in the present state of clinical therapeutics, with exclusion of all independent, skeptic doctrines and of all matter that might have been introduced in deference to the views of certain special schools of medical practice.

Diseases of the Circulatory System.

GENERAL CONSIDERATIONS.

It may not be amiss to recall once more that any plan of treatment, to be considered rational, must be based on a diagnosis aiming to be complete, the several components in such a diagnosis and treatment being: (1) The symptom. (2) The organic lesion. (3) The disturbance of function. (4) The morbid cause.

In no branch of medicine is this correspondence between diagnosis and treatment closer than in the cardiovascular diseases, each of the above-mentioned components affording a basis for active treatment.

The elementary clinical factor, *vis.*, the *symptom*, is an object of **symptomatic treatment**, which may be either purely empiric, traditional and utilitarian, or rational and based on experiment and pathologic physiology. Generally, it is of value only in accordance with the interpretation which may be placed upon it and which leads, in fact, to the other really essential elements in the treatment, *vis.*, the *organic lesion*, the *disturbance of function*, and the *morbid cause*. The main varieties of symptomatic treatment relating to the circulatory system will be found described in Part III in the sections on *Arrhythmia*, *Cough*, *Dyspnea*, *Edema*, *Fainting*, *Frequent pulse*, *Hemoptysis*, *High blood-pressure*, *Insomnia*, *Low blood-pressure*, *Oliguria* and *Slow pulse*.

The *location of the lesion* or *lesional diagnosis* is of much less therapeutic importance because of the lesion *per se* than because the lesion often leads to a causal diagnosis and permits of prediction of the later course of the disorder from the standpoint of function. Rather scarce, indeed, are the cases in which one may speak of a **lesional treatment**. Yet, one might cite in this connection:

Traumatism and foreign bodies of the heart, which are no longer beyond the resources of expert and bold surgical action.

It is doubtless not absurd to think that some day some cases of *mitral stenosis* will be amenable to a carefully planned *valvulotomy*.

Pericardial effusions, thanks to *paracentesis pericardii*, now a well worked out procedure, have passed into the domain of every day minor surgery.

Different forms of *aneurism*, especially the peripheral forms, involving, *e.g.*, the carotid, subclavian, popliteal arteries, etc., and arterial as well as arteriovenous aneurisms, are amenable to a more or less radical cure.

The same is true of many acute or chronic manifestations of phlebitis (phlebosclerosis, varicose veins) and of the circumscribed necrotic processes of localized arteritis.

Periarterial sympathectomy has already to its credit many interesting results (angina pectoris, Raynaud's disease, etc.).

Of much greater importance is the *functional diagnosis*. In cardiology, indeed, the syndrome, disturbance of function or pathophysiologic study is generally of greater significance, especially in clinical work, than the pathologic lesion itself and even the cause. The treatment of the chronic heart disorders is above all a **functional treatment**. The commonest therapeutic problems met with are those of cardiac insufficiency, of renal and cardiorenal insufficiency, and of pulmonary and cardiopulmonary insufficiency.

At bottom it is *weak heart action* (of all grades), *uremia* (taken in its original and comprehensive signification of urinemia) and *anoxemia* which are the three essential clinical syndromes of chronic cardiovascular disorders and which preponderate in any presentation of the subject of circulatory therapeutics.

Even though high blood-pressure and low blood-pressure are elemental clinical conditions common to widely different morbid states, *a few syndromes of high and low blood-pressure* of great frequency and clinical importance will have to take rank along with the preceding conditions, with which, indeed, they are very often combined.

Lastly, there remains the factor which ordinarily dominates the therapeutic indications, *viz.*, the *morbid cause*. The **treatment of the cause** may and often does preponderate in the acute cases; it is always a source of valuable indications, even in the chronic cases.

The chief causes of cardiovascularitis which supply the pathogenetic indications are, in the order of frequency:

1. The *acute infections*: **Rheumatic fever**, *typhoid fever*, pneumonia, *scarlet fever*, various infections (especially pyogenic), different forms of inflamed throat, puerperal infections, etc.

The *chronic infections*: **Syphilis**, *malaria*.

2. The *metabolic or nutritional diseases*: **Gout**, *obesity*, uricemia, plethora.

3. The *intoxications*, either *exogenous* (*lead*, *tobacco*, *alcohol*, etc.) or *endogenous* (various autotoxic substances).

4. The disturbances of the *nervous system* and the *ductless glands*: **Exophthalmic goiter**, constitutional nervous hypersthenia, neuro-

vascular erethism, neuro-circulatory hyposthenia, constitutional hypophsyxia, emotions, passions and depressive psychoneuroses.

5. *Heredity:*

Infectious: Congenital syphilis.

Dystrophic and nervous: Metabolic diseases, neuro-arthritis.

Accordingly, a plan logically based on the foregoing considerations will be followed in the presentation of the therapeutics of the circulatory system. Such a plan seems to correspond best to the actual occurrences of practice and to didactic needs. It also seems to be the most likely to incite the mind to go through the essential procedure of *defining the indications*. Thus, in taking up as a whole the question of circulatory therapeutics, the following order will be adopted:

Pathophysiologic or functional indications: Circulatory syndromes: Cardiac, cardiorenal or cardiopulmonary insufficiency, etc.; neuro-circulatory asthenia, hypersthenia or ataxia.

Causal indications: Cardiovascular rheumatism, syphilis, or other infections; cardiovascular intoxications or neuroses.

Anatomic (pathologic) indications: Pericardial effusions, resections of the chest wall, etc.

Symptomatic indications: These have been systematically presented in Part III of this work (*Treatment of Symptoms*), many symptoms, such as cough, hemoptysis, dyspnea, etc., being common to more than one of the body systems.

Can it be said that this plan is not open to criticism? Unfortunately, no. It has, in particular, the defect of upsetting certain didactic customs and of requiring an actual adaptive effort on the part of the reader. It also has the more serious defect of apparently dissociating artificially well-defined clinical conditions and of disseminating in various sections of the work the several treatments required to meet the different indications. Reality, indeed, often escapes, like water, from the hand which seeks to hold it. It does not adapt itself to the hard-and-fast limits of standard groupings. A perfect classification would reflect perfect knowledge, which is far from being ours at present. It is therefore well to make in the plan selected any amendments necessitated by the object intended and practical necessities. This is what has been done herein. Adopting the general plan of the relative valuation of indications, I have described the treatment of weak heart action, of angina pectoris and of cardiac asthma on the basis of the pathophysiologic indications, which are dominant in these conditions; on the other hand, infectious pancarditis and the cardiac neuroses have been dealt with on the basis of the etiologic indications, while pericarditis with effusion

seemed best considered along the lines of the anatomic (pathologic) indications.

Many other adjustments have appeared necessary. In spite of the close functional relationship between the heart and the vessels, the heart disorders have been set apart, in conformity to custom, from the diseases of the vessels. This was not done without misgivings, since it necessitated the placing of the great syndromes of neurovascular asthenia, hypersthenia and ataxia, manifestly involving the circulation as a whole, in a rather questionable position. I nevertheless had to come to it, as many vascular disorders, such as aortitis, localized arteritis, phlebitis, varicose veins and hemorrhoids are definite pathologic and clinical entities, while many local vascular syndromes, such as arterial spasm, vagoparesis and Raynaud's disease are often closely combined with the foregoing general morbid processes.

As will be noted, I saw the wisdom and need, on account of clinical requirements, of changing somewhat the limits of the field originally to be covered.

TREATMENT OF CARDIAC INSUFFICIENCY.

For practical purposes, cardiac insufficiency dominates the whole of circulatory therapeutics. It is met with each day in the course of the most diverse heart affections—acute and chronic endocarditis, myocarditis, pericarditis; cardiovascular, cardiorenal and cardiopulmonary disorders, arteriosclerosis, etc. It is, therefore, deserving of somewhat detailed consideration.

The circulatory system constitutes an interdependent whole. Circulatory balance is the result of a permanent equality between the peripheral resistance which the blood must overcome in order to circulate and the propulsive power of the heart. This condition of harmony results, in turn, from a continuous automatic adaptation by reflex means, generally autonomous, of the force of the heart's action to the resistance which it must surmount. The heart adapts its activity to the task it must carry out, and no more; it exerts itself as little as possible. Let a vascular spasm of emotional origin require increased cardiac effort on account of the greater vascular resistance, or a prolonged exertion on account of the increased supply of blood to the muscles it necessitates, and the cardiac contractions will become more frequent, its output will rise, and it will perform its work at the speed required for it to "make the grade." Let rest and quiet

follow the period of exertion or spasm, and the heart will slow down, its output become less, and it will return to the resting state.

In short, between the minimal work entailed by absolute rest and the maximal work entailed by the utmost exertion of which the body is capable there is a varying margin of cardiac reserve power which allows it to adapt itself without failure to any exertion which it is called upon to make within these limits. If the upper limit is exceeded, however, and the reserve power of the heart is used up, proper balance can no longer exist, the heart is no longer equal to its task, and the condition known as cardiac insufficiency is produced.

Estimation of this reserve power is therefore of prime importance.

Knowledge of its limits and of the causes of overwork of the circulation is essential, since it is this which, in the last analysis, will regulate the measures of cardiac hygiene to be taken.

This reserve power is of varying extent in different individuals, but has its limits in all, including even the soundest and most vigorous bodies. The legendary runner of Marathon, no doubt an athlete, had exhausted it, since he fell dead upon the conclusion of his errand. That the customary duration of the rounds in a boxing-match is three minutes is probably based on the circumstance that experience showed the professional boxers that beyond this time a majority of the contestants were overtaxed and were unable to regain the necessary poise for starting the next round. This actual or potential reserve power varies greatly in different persons.

Hearts free of organic disease in the customary sense of the word may nevertheless be congenitally weak, and their possessors constitutionally hypophyseic and exhausted on the least exertion. Again, hearts with pronounced aortic or mitro-aortic lesions, or those of cardiorenal cases, may exhibit a considerable amount of reserve power. Not only is the defect compensated, but the inherited quality of their myocardium is such that they possess, in addition to a sometimes considerable *actual reserve power*, compatible with a normal life entailing the usual exertions, a *potential reserve power* which confers upon their myocardium the possibility of becoming further hypertrophied in order to adapt itself, if circumstances require it, to a still greater excess of function. It is because they overlooked this fundamental fact that a few cardiologists have thought it possible to deny all significance to the tests of cardiac function on the ground that the results of the tests which had been suggested might prove satisfactory despite the presence of obvious lesions and prove only fair or poor in individuals apparently free of all disease. We are simply not talking in the same language: The criterion proposed is a functional

criterion, while the objection raised is lesional in nature. Now, it cannot be repeated too often that **there is no necessary relationship between the extent of the lesion and the disturbance of function.** A diseased heart may be perfectly compensated and possess reserve power which will enable it to overfunction within wide limits; a heart without a lesion, but weak, may have a very restricted margin of overfunctioning power and "give up" when confronted with a relatively slightly increased demand. Who among us has not been following for many years the cases of athletically inclined persons, or actual athletes, with hearts exhibiting pronounced mitral or mitro-aortic lesions.

In "*Clinical Diagnosis*" I have described a number of functional tests permitting of estimation, in a measure, of the reserve power of the individual heart. All that is required is to subject the patient to a series of exercises of increasing duration and intensity until one among them causes prolonged disturbance of the heart-rate and blood-pressure.

Aside from this, there are many clinical signs—albeit rather late ones, which, in my opinion, one should not wait for before acting—which will reveal this imminent exhaustion of the myocardium, *viz.*, dyspnea on exertion, persistent increase of rate, orthostatic oliguria, slight vesperal edema, congestion of the liver with tenderness, congestion of the bases of the lungs, etc.

Functional standards of a normal heart cannot be definitely specified. For practical purposes, a heart may be considered functionally normal (with or without a lesion) when it is capable of withstanding without appreciable weakening (such as would be evidenced by a prolonged increase of rate, prolonged dyspnea, or indications of yielding of the blood-pressure, etc.) the normal tests of motor activity and exertion corresponding to the age of the individual (various games and sports in childhood; military training in youth; hikes, manual labor, climbing, active sports, hunting, etc., in the adult; more moderate walks and gentler sports in later years).

Cardiac insufficiency will exist when, the limit of overfunctioning having been exceeded, the heart exhibits signs of weakening, slight or marked, temporary or permanent. All grades of insufficiency may be met with, from the slightest and most evanescent, yielding to a few hours' rest, to the more serious and sometimes irremediable, to which the term heart failure may be applied.

For practical purposes and didactic convenience the treatment of cardiac insufficiency may be considered under the following heads:

1. Preventive treatment of cardiac insufficiency.

- II. Treatment of relative cardiac insufficiency.
- III. Treatment of absolute cardiac insufficiency.
- IV. Treatment of combined cardiac insufficiency (cardiopulmonary or cardiorenal).
- V. Treatment of angina pectoris.
- VI. Treatment of cardiac asthma.

I. PREVENTIVE TREATMENT OF CARDIAC INSUFFICIENCY. GENERAL HYGIENE OF HEART CASES.

This is the treatment which is indicated for preventive purposes in subjects in whom progression of the insufficiency is to be feared on account of a congenital debility of the heart (congenitally hypophysic subjects) or an acquired lesion (chronic endocarditis; congenital malformations; cardio-aortic, cardiovascular, cardiorenal or cardiopulmonary affections, etc.)—in short, on account of any form of heart disorder.

This treatment should have *two objects in view*:

1. *To exclude through proper general hygiene such influences as would be likely to bring on circulatory insufficiency by disturbing the balance between vascular resistance and the power of the myocardium.* These influences are many, and may act selectively on the inherent properties of the heart (contractility, conductivity and irritability), increasing or reducing them, or on the vessel walls, dilating or constricting them (general or partial vaso-constriction or vaso-dilatation, deep and visceral or superficial and cutaneous). No other system in the body is as sensitive as the circulation, and none is more closely related to the nervous system; accordingly, it will react to almost all sources of physiologic stimulation—muscular, dietetic, toxic (exogenous or endogenous) and psychic. General hygiene must therefore be precisely regulated.

2. *To increase, if possible, the reserve power of the heart* and thus, likewise, the margin of activity permissible for the subject through the resulting diminution of the risks of disturbing circulatory balance.

* * *

1. The general hygiene of heart cases at bottom resembles closely that which applies to the normal individual desirous of keeping well. In both instances, though particularly the first, the subject will have to avoid as much as possible all infections and intoxications detrimental to the heart, especially rheumatism, syphilis, scarlet fever, typhoid fever, diphtheria and tonsillitis, as well as alcoholism, lead

poisoning and tobacco abuse. Alcohol should be strictly forbidden, occupations exposing the individual to lead (painting, plumbing, printing) carried on only with the greatest precautions, and tobacco interdicted in patients with arteriosclerosis, aortic disease, angio-spastic disturbances, and *a fortiori*, angina pectoris. Infections should be prevented by the usual prophylactic measures—avoidance of exposure to cold, of illicit intercourse, of contact with infectious cases and of drinking suspicious fluids; removal of infected and infecting tonsils and adenoid vegetations; careful treatment of dental infections, etc.

In short, there should be a **general prophylaxis against infections and exogenous intoxications.**

2. I have already dwelt sufficiently on the reserve power of the heart, on its variability in different individuals and on its relative independence of any existing heart lesion to make it unnecessary to go over the matter again here. Let it be noted merely that **motion** and **exercise** constitute the main factor of circulatory excitation; that muscular contraction is paralleled by corresponding cardiovascular activity, and that circulatory training is absolutely correlative to muscular training. The amount of exercise must therefore be systematically regulated and must be neither excessive nor insufficient. The heart as well as the voluntary muscles must be kept in the vicinity of their maximal output, without exceeding it, lest weakening occur, and without falling below it too much, lest degeneration follow. The hinges of a door kept closed too long get rusty.

A special problem is therefore presented in each individual case, which must be solved by observation and experience. In general, *one may and should allow any form of exercise, training or sport which the subject is able to go through without experiencing any discomfort (prolonged increase of rate, lasting palpitations, marked dyspnea, etc.).* The kind and duration of exercise can, if desired, be decided on the basis of direct functional testing (see "*Clinical Diagnosis*").

Generally, strenuous sports (fencing, boxing, running, mountain climbing, etc.) and great exertions (carrying heavy weights, heavy manual labor, etc.) will have to be forbidden; all hard or prolonged climbs will have to be avoided. Aside from this, in determining the daily amount of muscular work to be allowed and giving counsel in regard to the pursuit of certain occupations or an habitual or exceptional indulgence in certain sports (hunting, horseback riding, etc.), the question is one of individual experience, requiring nice judgment and care in order that there shall be no errors either of excess or of lack. In any event, it is better to remain on the safe side than to allow more than can possibly be performed. Excess of exercise is,

to be sure, attended with greater risk in these cases than insufficient exercise.

In regulating the exercise taken, it is necessary to take into account the bodily habits contracted by the individual: An exercise gone through routinely and almost automatically will tire the heart much less than another much less strenuous exercise to which the subject is not accustomed and which therefore involves much greater nervous tension. This nervous influence of exhaustion and angio-spasm is very pronounced and will be referred to again later. Thus, a person accustomed to sawing wood without giving out will exhaust himself rapidly in threshing or mowing wheat. An expert swimmer will be "done out" by a few minutes' horseback riding if he is not a rider. A person living in flat country should not be sent to the mountains, etc. These things are commonplace, but the point is that they must be duly recalled when needed.

3. Almost as important as the regulation of bodily movement is that of the diet. Most persons, whether healthy or ill, show a much greater tendency to overeat than to undereat. Overeating must especially be avoided, for a number of reasons: (1) Obesity is highly detrimental in heart cases because the excess of weight requires greater exertion at every step, predisposes to fatty change in the myocardium and is often accompanied by plethora with high blood-pressure (see *Plethora*). (2) A distended or puffed stomach is a very poor neighbor for the heart; by exerting pressure on the diaphragm it may displace the heart considerably, compress its right side and be the cause of serious and sometimes fatal cardiac embarrassment. The marked rise of pulse rate and dyspnea on the slightest exertion after an unduly heavy meal are well known. The torpor of the *boa constrictor* after its monstrous meal is an example to be borne in mind.

Thus, the diet should be regulated both as to quantity and quality.

It should be *moderate* in amount and adjusted empirically in accordance with the body weight. The heart patient should weigh himself weekly, and the scales will reveal automatically the undesired accretion of fat or ominous edema. *The heart patient should tend toward a weight slightly below the normal* and should not hesitate to take up a reduction cure to obtain this end. There are, however, obese cases and plethoric cases whose optimal weight is above the normal and who could not be reduced to the normal without risk (see *Obesity* and *Plethora*). But as a general rule, *there is nearly always advantage in having a heart patient lose weight.*

The diet should be *mixed*, with a marked predominance of milk, vegetables and fruit. A strict vegetarian diet is far from being the best

diet; it necessitates much too large an amount of food for maintenance purposes and, being too rich in calcium salts, promotes calcareous changes (Bouchardat's phosphypostasis; frequency of atheroma in herbivora). Therefore, a mixed diet should be given, with the taking of meat, fowl or fish preferably limited to the noon meal and in moderate amount—120 to 150 grams. Certain purin-yielding articles, such as sweetbread and kidneys, should be avoided. Pork products, shellfish, mushrooms and preserved foods should be taken only exceptionally. In short, all foods reputed to be potentially toxic should be excluded.

The patient should be advised to use salt and salted foods only in great moderation, as these articles may promote edema in those predisposed to it. The same advice should be given as regards sugar and sweet articles, fats, sauces, ragoûts, and fatty foods which favor fat deposition.

The question of *fluids*, both as to quantity and quality, is of much importance. The greater part of the water taken in has normally to be eliminated in the form of urine, thus requiring conjoint work on the part of the heart and kidneys. If the capacity of the kidneys to eliminate water is diminished on account of nephritis or fibrosis, the work of the heart is necessarily increased. Restriction of water should therefore be stringent according as the renal impairment is pronounced and the reserve power of the heart limited. In a general way, it will be well to restrict the daily fluid intake to 1 liter or at most $1\frac{1}{4}$ liters, *e.g.*, $\frac{1}{4}$ liter of coffee and milk at breakfast, $\frac{1}{3}$ to $\frac{1}{2}$ liter of beverage at noon, $\frac{1}{4}$ liter of beverage or infusion at 4 p.m., and $\frac{1}{3}$ to $\frac{1}{2}$ liter at the evening meal. This question of fluid intake may be settled by actual test by means of the diuresis test (see "*Clinical Diagnosis*").

As for the kind of fluid to be taken, *alcoholic beverages* should obviously be *strictly interdicted*, although it must be conceded that in some patients with impaired gastric secretion, after a meal rich in fats, the taking of a little alcohol undoubtedly facilitates digestion; but as a matter of fact, the diet of a heart patient should always be sufficiently reduced to eliminate the need of such an artifice. *Should tea and coffee also be forbidden?* To my mind, it is only in nervous, irritable subjects and those in whom tea or coffee causes excitement, insomnia or palpitations, that these beverages should be interdicted. In other cases, it is all the more justifiable to allow them in moderate amounts in that they often constitute useful stimulants and sometimes very serviceable diuretics.

As for the *time of the meals*, the following scheme has seemed to me to be generally best:

8 a.m.: Tea or coffee with milk, sugar, crackers or toast without butter.

12 m.: A mixed meal, moderate in amount; $\frac{1}{3}$ to $\frac{1}{2}$ liter of fluid; if desired, a demi-tasse of coffee.

4 p.m.: A bunch of grapes, or a cup of weak tea or milk.

7 p.m.: A light dinner: Soup, $\frac{1}{2}$ plateful; vegetables, fruits; $\frac{1}{3}$ liter of fluid; if need be, an egg or a little chicken.

4. A number of other questions may and must be quickly run over.

The harmful influence of repeated emotions, of prolonged worry, overstrain, difficulties and anxieties has long been recognized. The laity perhaps even ascribe an exaggerated amount of importance to mental factors in the causation of cardiovascular diseases—and perhaps physicians underestimate these factors. At any rate, it is well to advise heart patients to regulate their mode of life on as quiet a plan as possible and to try to eliminate all sources of worry, emotion and overstrain. Herein, as in the case of physical exercise, however, it is necessary not to overstep reasonable bounds, lest the result be the transformation of a well-compensated heart patient, free of anxiety as to his condition, into a hypochondriac obsessed with a disease which mental distraction had previously led him to overlook. It is necessary both for the individual and the community in which he lives to provide each one with a useful outlet for his activities and enable him to reach a maximum output. It would be absurd to condemn a heart patient to idleness, as such idleness would be attended with greater risk to him than a properly regulated occupation. Here again, circumstances are different in different cases. Great nicety of judgment and much thought are required in this connection.

The question of **marriage** is of the same type. Marriage can be allowed and even advised in nearly all patients with good compensation, and even in mitral stenosis the radical dictum: "Girl, no marriage; woman, no child," is certainly unduly severe. It is really only in subjects with reduced reserve power, who develop breathlessness, rapid heart-rate and palpitation on the least exertion and are always on the brink of cardiac functional failure that such an interdiction may be made. At all events, it is well to enjoin caution and moderation in sexual intercourse and to exercise careful supervision in a pregnant heart patient. A heart complication may necessitate interruption of pregnancy; but such an event is, on the whole, rather rare.

Pregnancy is, as a rule, quite well borne by a heart patient who has had good compensation up to that time.

Edema of the lungs should always be looked for, especially in cases of mitral stenosis; subcrepitant râles persisting after cough or after a deep breath, and especially dullness at the bases, are signs which render the induction of premature labor imperative.

The question of **sleep** is also of importance. The heart never goes to sleep save in eternal rest; but it is nevertheless true that a period of quiet sleep is for the heart a period of comparative rest during which it is freed of the "fatiguing" effects of bodily motion and of stimuli alike physical and mental and alike external and internal in origin. A good sleep of sufficient duration is an evidence and a pre-requisite of satisfactory compensation. It is advisable to look after the matter carefully and, if necessary, to restore the ability to sleep by ordering rest, a more stringent diet, tepid hydrotherapeutic procedures, and even exceptionally the administration of some sedative drug, such as valerian, the bromides, and still more exceptionally, small doses of chloral hydrate, of chloral with bromides, or of nyctal or barbital. Nyctal (brom-diethyl-acetyl-urea) is a hypnotic of choice for most heart cases.

Hydrotherapy is of great value. Tepid baths at 34 to 36° C. (93.2 to 96.8° F.) lasting only five or ten minutes are always to be recommended in all cases. They insure proper functioning of the skin and relieve the deep circulation. They should be continued for twelve to twenty minutes in high-pressure, irritable and angiospastic cases, and, on the other hand, shortened in atonic, low-pressure and hypophyxic cases.

In general, warm hydrotherapeutic procedures, such as baths above 36° C. (96.8° F.) and vapor baths, as well as hot air and light treatments, are inadvisable, being depressing to most heart patients and even dangerous to many.

As for cold hydrotherapy in its milder modalities, including sponges, rain douches and cold packs, it may be of great service in certain individuals, constituting a hardening and strengthening procedure.

* * *

There is one special form of hydrotherapy which I have been using for a long time with excellent results and which I shall take the liberty of describing in some detail.

The referred pains in cardio-aortic disorders (angina pectoris) are manifested, on the one hand, in the areas of distribution of the 1st,

2d and 3d dorsal segments, and, on the other hand, in the thoracic region in the areas of distribution of the 5th, 6th, 7th and 8th dorsal segments (Head's zones).

Conversely, any peripheral irritation in these cutaneous areas likewise reacts reflexly on the cardio-aortic system. It seems to be a fact that forcible percussion of the last four dorsal vertebræ brings about a reflex vaso-dilation of the aorta and that, on the contrary, percussion of the 7th cervical and 1st dorsal causes a vaso-constrictor reflex (Abrams).

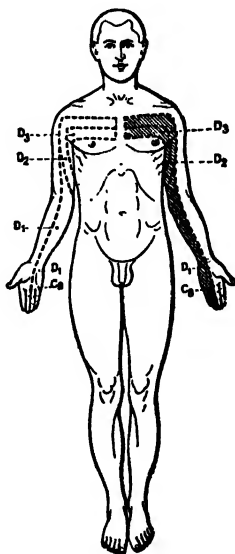


Fig. 271.—Distribution of the pain and cutaneous hyperalgesia after repeated attacks of angina pectoris.

C₈, 8th cervical; D₁, D₂, D₃, 1st, 2d and 3d dorsal segments.

A cardio-aortic visceral irritation will manifest itself outwardly in the form of a definite corresponding area of cutaneous hyperesthesia; conversely, an irritation of the skin in this area will react reflexly on the cardio-aortic system. There is thus a reversible viscerocutaneous-visceral cycle (a special instance of a pathophysiologic principle of widespread bearing) which affords therapeutic applications of great interest.

Indeed, long experience has led me to note the following facts:

Any active irritation of the above-mentioned area of skin (inner ulnar aspect of the upper limb and the upper thoracic region) exerts on the aortic region and heart an excitant vaso-constrictor action which is manifested in a rise of blood-pressure and a recession of

the cardio-aortic shadow in fluoroscopy. Such an irritation may be procured by means of very hot or very cold applications, by pinpricks or pinching, by fulguration (high frequency), etc. It finds its expression, in the last analysis, in a stimulating, tonic action on the heart.

Any gentle, sedative, vaso-dilator stimulation of the skin of the same region exerts on the heart and aorta a sedative, vaso-dilator action generally manifested in a reduction of the blood-pressure, systolic and diastolic, and the abatement of anginal symptoms (retro-sternal and precordial discomfort or pain, etc.), when present. The cardio-aortic fluoroscopic shadow shows no appreciable change. This sedative effect may be obtained by tepid moist applications at 34 to 36° C. (93.2 to 96.8° F.) (arm baths, moist applications) continued for ten, twenty or thirty minutes.

Accordingly, there are **two hydrotherapeutic procedures** of which I make very frequent use:

1. In **high-pressure angiospastic cases** with anginal manifestations: *Warm arm baths* (36 to 38° C.—96.8 to 100.4° F.) continued for ten to twenty minutes, taken either preventively in the evening, before or after dinner, according to indications, or at the time of the attacks of pain.

2. In cases of **cardiac asthenia, requiring habitual cardiac stimulation**: *Cold arm baths* (8 to 22° C.—46.4 to 71.6° F.) or even very cold arm baths (0 to 8° C.—32 to 46.4° F.), lasting only a few seconds and repeated, according to the reaction observed, three to six times at half-minute intervals. The simplest plan is to include this procedure in the patient's daily toilet. Using a rather broad wash-bowl, filled with water, the arms are simply dipped into it the required number of times; the forearms and the inner surfaces of the arms take up the stimuli which tone up the heart.

This procedure is a long-tested one which can be highly recommended and is capable of proving of the greatest service.

Stimulation of the same areas by other means, such as *very hot* applications (48 to 50° C.—118.4 to 122° F.), *diathermy* (high frequency) etc., may be used in addition with similar results.

* * *

The influence of **climate** in cases of heart disorder is also deserving of attention. No climate can be found which is definitely appropriate for diseases of the heart, such as can be found for lung disorders, but it should be recalled that there are *three conditions which are very unfavorable* for per-

sons with a weak, failing or insufficient heart, *viz.*, *severe cold*, *high winds* and *high altitudes*.

Severe cold demands a degree of circulatory and vital activity which is not available in these cases.

High winds which spank the patient's skin surface also entail much danger, probably because they lead to sudden muscular exertions and induce vascular spasms which increase the work of the heart.

High altitudes, which frequently induce heart disturbance even in healthy subjects, exert a serious influence in these cases in that they tend to produce sudden weakenings and dilatations, and journeys to such elevations are absolutely contraindicated unless compensation is most satisfactory. Even then, a journey to a high altitude may bring about rupture of compensation.

* * *

There remains the question of **cures at watering places** for patients in good financial circumstances. This question comes up only in the stage of compensation and in the succeeding stage of partial insufficiency. The patient with actual heart failure must remain at home, avoiding journeys and *a fortiori* thermal cures.

The choice of a resort depends much more on the kind of cardiac disorder, the nature of the observed disturbances of function, the chief localization (endocardial, arterial or venous, etc.) and the morbid temperament of the patient than on any other considerations. The following classification is, on the whole, sound; it is that of Piatot ("*Clinique hydrologique*," Paris, 1909):

I.—FUNCTIONAL DISTURBANCES.

1. Purely nervous or neurasthenic cases (Néris).*
2. Rheumatic subjects or neuropaths (Bourbon-Lancy).
3. Anemic, including chlorotic, subjects (Royat).
4. Obese, gouty subjects with abdominal plethora (Brides).

*[Much less importance is attached to health resorts in the treatment of heart cases in the United States than in Europe. The general view is that most of the benefit that may result from such "cures" is due to the well-regulated life and change of environment rather than any virtues of the waters themselves. In heart disease long trips and excessive purgation may alike do harm. The above classification appears of just sufficient interest to warrant its inclusion in this translation. The resorts mentioned are those of France only. The general features of each of these resorts will be found by turning to the section on *Crenotherapy* in Volume I, under French Resorts. Most of the resorts referred to are among those affording thermal and radio-active waters or carbonated baths.—TR.]

II.—RECENT ENDOCARDITIS.

1. Robust and sluggish rheumatic cases (Bagnols-de-Lozère).
2. Neuropathic or painful rheumatic cases (Bourbon-Lancy).
3. Depressed or anemic subjects (Royat).

III.—COMPENSATED VALVULAR DISEASE, AT THE BEGINNING OF CARDIAC INSUFFICIENCY.

1. Depressed and anemic patients (Royat).
2. Nervous and irritable patients (Bourbon-Lancy).
3. Mitral stenosis (combined cure at Royat or Bourbon and at Vichy).

IV.—PRESCLEROSIS AND EARLY ARTERIOSCLEROSIS.

Diuretic cure mainly:

1. Nervous, irritable cases (Évian).
2. Sluggish, gouty cases (Vittel).

V.—VARICOSE VEINS AND PHLEBITIS.

1. Functional restoration (Bagnols-de-l'Orne—local action mainly).
2. Rheumatic, nervous, congestive and painful cases (Néris).

* * *

Can more be done than to keep a heart case in a state of compensation and obviate acute heart weakness?—Can the reserve power or myocardial resistance of the heart be increased? There is no doubt of it in the majority of cases, but here everything depends on a special factor, clinically very obvious, but the exact nature of which is not yet well known, *viz.*, the latent reserve power of the heart—that which is capable of developing either by reason of a need of pathophysiologic compensation or as a result of myocardial training cures. Heredity has endowed each one of us with a heart-muscle possessing, like all other organs, a faculty for development or accretion of varying extent. In some persons, normal, physiologic development or growth almost or quite exhausts this congenital reserve capacity. In others, it uses up only a fraction of it, leaving available and latent a considerable amount of power.

This is a clinically evident fact. There exist individuals with congenital cardiac debility in whom heart training and hyperfunction are almost impossible, and who should and can live only at a slow pace and will compensate but poorly the least heart disorder, if,

indeed, such a disorder does not prove fatal to them. This is the case in many hypophosphemics. Heart training is practically impossible in these subjects. They are always on the brink of cardiac insufficiency. It is only in childhood that one is justified in trying, with great caution, to increase the strength of the heart in these individuals.

At the other extreme are the congenitally athletic hearts. The most striking example of this is afforded by the ox-hearts of cardio-renal cases, the enormous hypertrophy of which bears witness to a "colossal" grade of hyperfunction. I have been following for over fifteen years several cardio-renal cases with markedly high blood-pressure (300, 280, 260 mm. Hg), with hearts the seat of a sufficient degree of hypertrophy and leading, on the whole, lives normal for persons of their respective ages, and in some instances very active lives. One of these patients, aged seventy-two years, with pronounced albuminuria and high blood-pressure, sometimes very careless as to his diet, has been able to maintain perfect circulatory balance thanks to a heart which has so far responded adequately to whatever demands have been made upon it, and is still the directing head of a large business as he was twenty years ago. He has sometimes exceeded the limits of his arterial resistance, his arterioles have at times given way and he has had severe attacks of epistaxis, but his heart has never weakened. Such persons possess constitutionally, through inheritance, an enormous latent capacity for growth of the heart. One can conceive that it would be possible to call upon this latent capacity and develop it when required.

Between these two extremes, the cardiac weaklings and athletes, are all other individuals in a naturally graded series, in whom one may, within a varying margin, call upon this property of hypertrophy or hyperfunction—in short, subject them to a course of myocardial training with more or less benefit. Such considerations are applicable, as a matter of fact to all other organs—the liver, kidneys, brain and nervous system in particular.

The components of such a course of myocardial training are:

1. *Essentially: Myotherapy (kinesitherapy).*
2. *Secondarily: Hydrotherapy.*
3. *If required: Organotherapy.*

Myotherapy will consist essentially in subjecting the patient, under very close supervision, to a course of kinesitherapeutic, and consequently progressive cardiotherapeutic training. Any of the forms of muscle training, including Swedish gymnastics and mechanotherapy in particular, may be availed of, provided they be absolutely systematic and progressive. The "terrain cure" is especially suitable because it

lends itself to precise dosage. Its nature is well known (see Vol. I: *Kinesitherapy*).

The treatment of cardiac debility represents, on the whole, merely one instance of the treatment of muscular debility. As Heckel wisely says, it is by fatiguing himself that a person trains himself to undergo fatigue; it is by training his heart to perform a regularly increasing amount of work that he will overcome his debility. Cœrtel had already proclaimed this fact; his "terrain cure" is none other than a course of heart training regulated as to dosage. It is based on the fundamental principle that regular and progressively increasing activity of an organ strengthens it, provided the limits of its resisting power are not overstepped, and the object is to increase the contractile power of the heart-muscle and enhance its contractions by systematic exercise and walks of increasing severity. Heckel, in turn, formulates the following axiom, to which I heartily subscribe: Progressive, systematic muscular exercise maintains the normal circulatory functions and restores them when they are disturbed; it is useful to the normal heart and indispensable to the diseased heart.

That such exercise must be regulated precisely; that the earlier exercises should be conducted under careful medical supervision, with the pulse-rate, respiration, and especially systolic and diastolic pressure determinations as guides; that they should under no circumstances be left in the charge of incompetent persons, particularly dangerous under such conditions, is self-evident. But with these precautions taken, no therapeutic procedure is more easily and accurately adjustable, more elastic, than this one—ranging from passive movements and massage to the moderately strenuous sports (tennis, swimming, bicycle riding, etc.), through the finely graded scale of the simple active movements, Swedish gymnastics, co-ordinated exercises, with all the variations procurable through adjustments of rate and the use of graduated exercises.

No single course of rational training, applicable without distinction to all cases, can be formulated. In the aggregate, however, my personal procedure follows fairly closely the following plan:

First stage: Rubs, massage and passive movements of the muscles of the upper and lower extremities, performed in the horizontal posture.

Abdominal massage (effleurage, pétrissage, deep vibrations)—precordial vibrations (for a few minutes).

Second stage: Active movements carried out on the floor: Elevation of the lower limbs toward the body; flexion of the thighs on

the abdomen; raising of the body toward the lower limbs, with breathing exercises interspersed, in the horizontal posture.

Third stage: Active movements against resistance: With dumbbells (1 to 2 kilograms), against the resistance of elastic cords (exercisers of various kinds), or against physiologic resistance ("resistance exercises").

Fourth stage: Progressive synthetic (coördinated) movements: Walking on level ground for increasing periods and at increasing speed; walking on rising ground, stair-climbing, up to skipping the rope, the most strenuous of the synthetic movements.

The instructions given as to exercise should be as precise as a prescription for drugs:

Massage (effleurage, pétrissage, vibrations):

Of such and such a region (precordial, abdominal, perirenal);

For such and such a time.

Movements (to be shown exactly in a diagram):

At such and such a rate (number per minute);

For such and such a time.

Sports (walking, tennis, rowing, bicycle riding, etc.):

For such and such a time.

Hydrotherapy need not be discussed again, as its underlying principles and general modes of application have already been recalled. It consists, likewise, in bringing the myocardium, through a systematic and progressive course of training, to respond favorably to cutaneous stimuli.

Cardiac Organotherapy.—It seems rather peculiar that, until recently, all forms of organotherapy had been tested—even those which seemed most bizarre *a priori* (prostate, ciliary body, retina, etc.)—with the exception of cardiac organotherapy.

The latter nevertheless proves decidedly effective as a trophic agent with reference to the heart-muscle, capable of increasing the reserve power of the myocardium.

The *indications* for it are very broad, and clinically are represented mainly by *congenital myocardial debility* (in hyposphyxics) and *acquired myocardial degeneration* (degenerative myocarditis, especially that following infections).

In the first instance, that of *cardiac debility in the young*, recourse should be had to relatively large doses corresponding to 60 or 100 grams (2 to 3½ ounces) or more of the fresh organ.

In the second instance, that of *cardiac debility in the aged*, intermediate or small doses, corresponding to 5 to 50 grams (1⁄6 to 1½ ounces) of fresh heart, should be employed.

MODES OF ADMINISTRATION.—One may prescribe:

A *maceration*, extemporaneously prepared:

Maceration in the cold for four to six hours, preferably in the ice-box, of 50 to 100 grams or more of chopped beef heart in an equivalent quantity (50 to 100 cubic centimeters or more) of physiologic saline solution. The product is strained through cheese-cloth folded into six layers. It is given preferably as an enema, with a few drops of laudanum added, if necessary, to secure its retention.

Dry extracts, viz.:

Powdered heart, a dry extract prepared by concentration *in vacuo*. It corresponds to seven or eight times its weight of fresh heart.

Heart peptone (dry extract, peptonized and soluble), corresponding to about eight times its weight of fresh heart.

These last two preparations are prescribed—

Either by enema: One to two teaspoonfuls for the larger doses, corresponding to 30 or 60 grams of fresh heart, dissolved in 50 cubic centimeters (1½ ounces) of saline solution or pure water.

One might prescribe:

Heart peptone	1 or 2 teaspoonfuls;
Yolk of egg	1;
Distilled water	150 c.c. (f3v).

A few drops of laudanum could be added in the event of non-retention.

Or by the mouth: In doses of from 1 gram (in a powder) up to 5 or 10 grams (1 or 2 teaspoonfuls) with the meals in a cupful of meat or vegetable bouillon or in a purée.

These preparations are not suited for cachets or capsules, as meat powders undergo putrefactive changes easily. The powder form is to be recommended for the large doses; the contents of an opened bottle of the powder should be consumed within a week or ten days, to eliminate the possibility of decomposition before use. The characteristic odor of the peptone product requires "camouflage" in a soup or purée.

An *elixir* is a practical preparation from this standpoint.

Given in these forms, **heart peptone in large doses** (5 to 15 grams) **meets three indications**:

Trophic to the heart, a valuable effect in congenitally hypoplastic, weak, hypophyxic cases.

Stimulant to the digestive functions, an action strongly indicated in these patients, most of whom suffer from reduced gastric secretion.

Superalimentation, 10 grams of the product corresponding to 80 grams of fresh heart, which is not a negligible addition to the diet.

From the clinical standpoint, heart peptone seems to be the most strongly indicated of the meat peptones in general.

II. TREATMENT OF RELATIVE CARDIAC INSUFFICIENCY (MINOR OR INCIPIENT INSUFFICIENCY).—The lengthy, albeit incomplete, presentation in the preceding section will permit of greater brevity in the present one, most of the facts presented therein applying, with minor modifications, to the stage of heart disease now under consideration.

Here the patient is on the brink of cardiac inadequacy. When he is at rest, quiet, or indulging only in restricted activity, submitting to a stringent or more or less liberal diet, the circulatory function is performed regularly. But as soon as he undertakes any unusual exertion, is subjected to the least emotional disturbance, or increases his diet to the least degree, insufficiency becomes manifest. Many symptoms, indeed, are present to indicate the instability of his cardiac balance: Dyspnea on exertion, sensation of painful tension in the heart region, congestion and tenderness of the liver, obstinate congestive bronchitis, edema of the bases, vesperal edema of the lower extremities, etc. The reserve power of the heart is nearing exhaustion.

Here the treatment is no longer prophylactic, but curative. The aim is no longer to foresee and prevent disease manifestations, but to reduce them. Medical intervention is imperative. Exercise, diet and various physiotherapeutic procedures are the subject, not of advice, of definite instructions. Lastly, a number of drugs, principally purgatives, diuretics and heart-tonics, secondarily sedatives and hypnotics, may be availed of with great benefit.

1. Rest and Exercise.—*Absolute rest* in bed or on a couch or arm-chair should be insisted on for the first few days.

There is no doubt that those who, in a case of flagging heart, prescribe digitalis or another heart- tonic without at the same time insisting on sufficient rest make a great mistake. Sufficient rest may mean, according to the case, either the interdiction of all active muscular exercise, or absolute rest in bed for a considerable time. The need for this portion of the treatment is obvious, as one is generally dealing with a "fatigued" heart.

Then gradually the patient should be put through the ascending scale of exercise therapy.

(a) *Rubs, massage and passive movements* of the upper and lower extremities, with the patient in bed.

Another very potent factor in recovery or, more accurately speaking, in improvement is the practice of *massage* and of *Swedish gymnastics* dur-

ing the period of rest. There is no doubt that while the heart is being rested by cessation of active movements, measures must be taken to increase the circulation of the lymph and blood by the use of the gentlest forms of massage and passive movements of the muscles, the hands of the masseur thus acting as supplementary hearts which assist the flow of the body-fluids. This massage or these passive movements must be very gentle, for if they are too forceful at the start they may cause fainting or weakening of the heart-action. Such a procedure improves the nutrition of the tissues, maintains muscular tone, prevents capillary stasis and frequently causes dropsy of moderate degree to regress. The method, as it is practised, *e.g.*, at Royat, is based mainly on the foregoing maneuvers while the stimulation of the skin by the bubbles of carbon dioxide in the water is acting as a muscular tonic.

(b) *Active movements in recumbency*: Raising the legs toward the trunk, flexion of the thighs onto the abdomen, raising the trunk toward the legs, with intervening breathing exercises.

(c) *Active movements against resistance*:

With dumb-bells (1 to 2 kilograms).

Against elastic resistance (various kinds of exercisers).

Against physiologic resistance (Swedish gymnastics).

(d) *Graded synthetic (coördinated) movements*:

"Terrain" treatment (walking on level ground for increasing periods and at increasing speed; walking on rising ground of increasing steepness, for increasing periods and at increasing speed; stair-climbing, etc.).

2. **Diet.**—It is well to combine with the absolute rest for two or three days or more, a *greatly restricted diet*, *viz.*, either *restriction to water alone* or a *milk or fruit diet*: One liter of water, infusion or milk in four divided amounts, taken at 8 a.m., 12 m., 4 and 8 p.m., or, if the patient prefers it and his stomach will stand it, four small meals of thoroughly ripe fruits, such as grapes, oranges, tangerines, bananas, or cooked fruits in a marmalade, compote, etc. A few dry cakes may always be allowed. With a little ingenuity one may thus plan diets which are both highly effective and very pleasant for the patients in whom previous repeated milk cures have induced an actual lactophobia.

Too much stress cannot be laid on the importance of the quantity of fluids taken (including milk and soups). *Restriction of fluids* is for heart cases, and especially for cardiorenal cases, a measure as essential as regulation of exercise, and one which is more certain to be effective than the prescription of digitalis. The customary use of a diet con-

sisting of 3 liters of milk has proven more often disastrous than markedly successful in heart cases; it is still too often employed: 3 liters of fluid is an excessive amount. All cardiologists agree that $1\frac{1}{2}$ liters is a daily quantum of fluid which should hardly be exceeded in heart cases.

Absolute rest and the extremely restricted diet above referred to generally prove sufficient to overcome the existing condition of cardiac insufficiency and, under their influence alone, the output of urine is observed to increase, the dyspnea and congestion to disappear, the edema to be absorbed, the pulse to become slower and more regular and the blood-pressure, systolic and diastolic, to improve.

The diet allowed should then be gradually increased, according to observation and tolerance, until that described in the preceding section is reached.

In any patient who has previously gone through one or more attacks of absolute or relative insufficiency, however, it is well to prescribe prophylactically *one or two days a week of absolute or comparative rest with restriction to water or a milk diet (1 to $1\frac{1}{2}$ liters) or a strict fruit diet.*

3. Depletive Measures.

(a) *Dry or wet cupping.*

(b) *Small blood-lettings by vein puncture.* These may always be recommended where the patient presents the least evidences of cyanosis or plethora.

4. Drug Treatment.—Recovery can be procured in the majority of instances without any resort to drug treatment. Yet this added measure is often useful and sometimes necessary, and it would be absurd to deprive one's self of it by reason of naturistic metaphysical speculations or through mere pusillanimity. Some battles have been won without the assistance of artillery; yet what strategist would dare proceed without it?

The drugs to which recourse may be had are chiefly the heart-tonics, the diuretics, the purgatives, the sedatives and the hypnotics, which may be used either *systematically or to meet certain special clinical indications.*

Heart-tonics, and more particularly the *digitalis products*, when properly employed, may always be availed of with advantage, especially at the beginning of treatment and "to start the ball rolling." It is like the push with the shoulder which gives the initial start to a cart stuck in the mud.

Digitalis is the outstanding drug. It may and should be given along various different plans, according to the type of case under treatment. One or the other of the following courses may be followed, subject to modification and increased or decreased dosage as indicated;

For ten days in each month: 0.1 gram ($1\frac{1}{2}$ grains) of digitalis leaf, or 0.0001 gram ($\frac{1}{650}$ grain) of French crystallized digitalin (or a corresponding amount of some other preparation).

Or, for three days in each week: 0.2 gram (3 grains) of digitalis leaf, or 0.0002 gram ($\frac{1}{325}$ grain) of French digitalin.

Diuretics are always useful adjuncts to the heart-tonics, with which they combine very well: *Squill*, *calomel* and *theobromine* are the remedies of choice in this connection.

They should be alternated or combined with the heart-tonics in one of the following ways:

(1) *For the first three days in each week:* 0.1 gram ($1\frac{1}{2}$ grains) of digitalis leaf, or 0.0001 gram ($\frac{1}{650}$ grain) of French digitalin, twice daily, morning and afternoon.

For the last three days in the week: 0.5 gram ($7\frac{1}{2}$ grains) of theobromine twice daily, morning and afternoon.

(2) ℞ Digitalis 0.05 gram (gr. $\frac{3}{4}$);
Theobrominæ 0.5 gram (gr. viiss).

Ft. cachet. No. i. Da tal. No. xxx.

Sig.: One cachet twice a day, morning and afternoon for three days in each week.

Or, French digitalin, 0.00005 gram ($\frac{1}{300}$ grain) may be substituted for the digitalis leaf in the above prescription.

Purgatives are indicated when there is congestion of the liver and stasis in the abdominal circulation—and this means nearly always. Calomel, the vegetable cathartics (scammony, jalap, aloes) and the salines each have their special indications.

A fortunate, time-honored combination ingeniously brings together a heart- tonic, a cathartic and a diuretic:

℞ Scillæ pulveris,
Resinæ scammoniacæ,
Digitalis pulverisāā 0.05 gram (gr. $\frac{3}{4}$).

Ft. pil. No. i. Da tal. No. xii vel xviii.

Twelve to eighteen of these pills should be ordered taken on the first three days of treatment, in conjunction with absolute rest and restriction to 1 liter of fluid a day.

If the liver is a participant in the disturbance, calomel may be added:

℞ Scillæ pulveris,
Resinæ scammoniacæ,
Digitalis pulverisāā 0.05 gram (gr. $\frac{3}{4}$);
Hydrargyri chloridi mitis 0.02 gram (gr. $\frac{1}{8}$).

Ft. pil. No. i. Da tal. No. xii vel xviii.

Sig.: To be taken in three days.

Some therapeutists have become exercised over the question of purgation. Guelpa and Burlureaux, for example, have championed the opposite theses of purgation as a saving measure and purgation as a harmful influence. Applied correctly and at the proper time, purgation is one of the most valuable resources of cardiac therapy. But, as in clinical therapeutics in general, much depends on the type of case. An invalid and weak heart patient should not be violently purged, but where the organic reserve power of the heart is not exhausted—which is true of by far the greater proportion of cases—evacuating, derivative and depletive medication is, in common with blood-letting, a most wholesome practice.

Sedatives.—A good sleep is, as already mentioned, the evidence and pre-requisite of satisfactory cardiac compensation. Insomnia is a reliable alarm signal in many heart patients. The decompensated case always sleeps poorly; quiet sleep attests to the restoration of circulatory balance. Rest and diet will often be sufficient to procure it. If such is not the case, there should be no hesitation in using sedatives—especially valerian and the borneol esters, bromides and chloral with caution and in moderation, and nycal or barbitol if required. Chloral hydrate, which, of course, must not be used to excess, is nevertheless a most excellent hypotensor sedative, particularly indicated in the presence of high blood-pressure.

Carbromal, or bromliethylacetylurea, is one of the hypnotics which are best borne by decompensated heart cases. It should be given in the evening in doses of one or two tablets.

The *total alkaloidal extracts of opium* (pantopon, omnopon, etc.), hypnotics exerting a favorable effect on the heart, are capable of being of great service, provided the risk of habit formation is borne in mind.

Glucose.—Sugar, even by the mouth, seems, in proper dosage, to exert a stimulating action on the heart which is worth taking into account. This action appears to be manifest particularly upon intravenous injection of hypertonic, 10 to 25 per cent. glucose solution in 50 to 300 cubic centimeter ($1\frac{2}{3}$ to 10 ounce) amounts. The tonic action on the heart is nearly always pronounced, being reflected in a rise of blood-pressure with increase of the pulse pressure and an increase, sometimes enormous, of the urinary output. Different observers have recommended in cases of cardiac insufficiency weekly intravenous injections of 100 to 300 cubic centimeters ($3\frac{1}{3}$ to 10 ounces) of 10 to 25 per cent. glucose solution. It should be noted, however that, a febrile reaction with a chill may occur, and that, in the opinion of Rathery and Boucheron, azotemia absolutely contraindicates such injections. In any case, only double distilled water and chemically

pure glucose should be used; the solution should be autoclaved carefully and strict aseptic precautions taken.

5. As regards **organotherapy**, **hydrotherapy** and **crenotherapy** in this stage of heart disease, the reader is referred to the data presented in the preceding section.

III. TREATMENT OF ABSOLUTE CARDIAC INSUFFICIENCY (MAJOR INSUFFICIENCY).—The distinction made between left ventricular insufficiency and right ventricular insufficiency is thoroughly warranted.

Left ventricular insufficiency occurs mainly in aortic and sclerotic cases; it is almost constantly combined with and consecutive to arterio-renal sclerosis. It nearly always unites cardiac and renal insufficiency. It will be discussed later with the cardiorenal syndromes.

Right ventricular insufficiency is nearly always coupled with right auricular insufficiency; there is nearly always a right-sided myocardial insufficiency, frequently with tricuspid insufficiency. This is the cardiac insufficiency of endocarditis, of mitral stenosis, of combined mitral disease, and of pulmonary and hepatic cases. It nearly always unites cardiac insufficiency with pulmonary and hepatic insufficiency. It will be discussed later with the cardiopulmonary syndromes.

Yet, just as one relatively seldom meets with purely hydremic, chloridemic, azotemic or albuminuric forms of renal disease and there is good reason to retain the old term "uremia" to designate the cases of renal insufficiency—by far the most frequent—which combine in varying proportions these several types of partial renal insufficiency, so there is good reason to retain the expression "heart failure" [*asystolic*] to designate the far more frequent cases which combine the several forms of cardiac insufficiency.

It is the total, entire, complex forms of heart failure which we shall consider at this point, specifying, however, the predominantly right-sided or left-sided nature of the syndrome.

Let it be added, finally, that in my opinion heart failure is mainly a question of dynamics; that in the last analysis it reflects the weakening contractile power of the myocardium, and that it is this dynamic failure which is its main feature and cause. It seems opportune to recall this simple, long-known and significant fact, even were it only to react against the cloudy obscurity within which there is a tendency for this question to be enshrouded.

The **general treatment of heart failure** may be summarized thus:

1. **Absolute rest** *in bed or on a couch or armchair.*
2. **A sharply restricted diet**, *summed up in Karell's specification: 800 cubic centimeters (27 ounces) of skimmed milk taken in four divided*

amounts of 200 cubic centimeters at regular intervals—8 a.m., noon, 4 and 8 p.m.

3. Various depletive measures, according to the case, to wit:

Tapping of ascites, hydrothorax or edema (punctures or drainage devices).

Wet cupping over the liver, kidneys or bases of the lungs.

4. Drug treatment:

Digitalis, which may be considered the specific for heart failure.

Too much space has already been devoted to rest, exercise, diet and depletive measures to make it necessary to refer to them here in detail.

At this point I shall merely:

1. Recall the *essential rules applying to the administration of digitalis.*

2. Illustrate by a concrete example the course of a case of heart failure during suitable treatment and the adjustment of such treatment to the course of the heart condition.

3. Refer briefly to certain cases of cardiac insufficiency which remain refractory or prove difficult to relieve.

4. Refer the reader to the sections on *Cardiorenal Syndromes* and *Cardiopulmonary Syndromes* for information as to the differences in the treatment appropriate for left-sided insufficiencies (mainly cardiorenal) and right-sided insufficiencies (mainly cardio-hepato-pulmonary).

I. Digitalis Therapy in Heart Failure.—Whatever cardiac affection be present, and whatever be the location of the valvular lesion, when the disorder is no longer compensated, when circulatory balance is disrupted, digitalis is the drug of choice.

It is indicated, then, *in all diseases of the heart or vessels in the stage of relative or absolute heart failure.* From what we know, however, of the natural course of cardiac and cardio-arterial diseases, we can foresee that the indication for digitalis will be much more frequent in mitral lesions than in aortic lesions and in mitral insufficiency than in mitral stenosis.

Yet, digitalis will prove really effective or specific in failing heart only if the following three conditions are fulfilled:

1. That the drug has been *correctly given, i.e.,* in the beneficial doses to be mentioned later, and that preliminary preparation has been made for its action by appropriate means: *Absolute rest, restriction of fluids* and, according to individual indications, cupping over the congested liver, punctures into the edematous legs or withdrawal of pleural or ascitic fluid—in short, removal of the *visceral and peripheral barrages.*

2. That dilatation of the heart is not excessive; that the *myocardium* still is possessed of some reserve power which will enable it to respond to digitalis stimulation, failing which, such stimulation can only hasten degeneration of the heart-muscle, and, as we have seen, it is in this respect that the response to digitalis constitutes such an important prognostic factor.

3. That cardiac conductivity has been retained; that there are no lesions of the bundle of His; *that heart-block is not present*.

Accordingly:

The patient having been placed *absolutely at rest* (in bed or on a couch or armchair); *restriction of fluids* having been ordered (600 to 1200 c.c.—20 to 40 ounces—of water, infusion or milk in four to six divided amounts at regular intervals: 8 a.m., noon, 4, 8 and 12 p.m., 4 a.m.), and the *peripheral barrage* (hepatic congestion, edema, transudates) *having previously been lifted* by wet cupping, punctures or paracentesis, digitalis should be prescribed.

The drug may, in some cases, be given *in massive dosage*—0.001 gram ($\frac{1}{615}$ grain) of the French crystallized digitalin [Nativelle's digitalin, generally considered similar to, if not identical with, digitoxin] in two doses twelve hours apart (8 a.m. and 8 p.m.) each dose consisting of 25 *drops* of the French official 1:1000 digitalin solution. [This equals 1 gram (15 grains) of digitalis leaf in the 24 hours. The French regard the 1:1000 "digitalin" solution as the standard digitalis preparation; and use it extensively; 50 drops of it=0.001 gram of the digitalin. Hereinafter, the equivalent doses in digitalis leaf will be prominently mentioned.—TR.]

If *the heart failure is of moderate degree*, considerable cardiac reserve power is still present, and renal permeability is still satisfactory, the results will be an almost immediate pronounced diuresis, slowing and regularization of the pulse and absorption of edema taking place with impressive rapidity.

If, on the other hand, *the heart failure is of advanced type*, serious myocardial degeneration exists, renal permeability is doubtful and the peripheral barrage very marked, the above method might prove disastrous; it will be better to employ the *fractional dose method*. Either, 0.001 gram of French digitalin [or 1 gram (15 grains) of digitalis leaf] may be given in five equal divided doses on successive days, *i.e.*, 0.0002 gram of digitalin [or 0.2 gram (3 grains) of leaf] on each of these five days, or, four descending daily amounts may be given, thus:

First day:	0.0004 gram digitalin	[0.4 gram (6 grains) leaf].
Second day:	0.0003 " "	[0.3 gram (4½ grains) " "].
Third day:	0.0002 " "	[0.2 gram (3 grains) " "].
Fourth day:	0.0001 " "	[0.1 gram (1½ grains) " "].

This standard average dose of 0.001 gram of digitalin [or 1 gram (15 grains) of digitalis leaf] should be increased or reduced according to the indications and response in the individual case.

It is well to use greater caution and divide the doses further, the more advanced the degeneration of the myocardium.

During the periods of merely relative heart weakness or intervening between the attacks of heart failure, courses of digitalis treatment may be repeated more or less frequently and with varying dosage and schemes of administration according to the clinical condition and individual response. This procedure has been well expressed by Mayor (*Presse méd.*, Jan. 27, 1912) as follows:

"Provided suitable doses be selected, digitalis, in spite of the usual view to the contrary, should, under certain definite circumstances, be administered to the heart case in a state of compensation. One should not wait, to give it, until repeated attacks of heart failure have brought on the condition of recurrent partial failure. As soon as the heart has become decompensated for the first time, treatment to prevent the succeeding attack should be instituted by systematic and regular administration of small doses of digitalis. As a rule, one should begin with the intermittent method, and only later, guided by circumstances, gradually shorten the intervals between courses until the continuous method is reached. Finally, there are some cases in which the intermittent preventive treatment may be instituted before the myocardium has yielded at all, heart-failure being known to be the rule later in cases of such a type."

For the intermittent treatment I generally prescribe 0.0001 to 0.0002 gram ($\frac{1}{650}$ to $\frac{1}{325}$ grain) of crystallized digitalin [= 0.1 to 0.2 gram ($\frac{1}{2}$ to 3 grains) of digitalis leaf], to be taken for the first three days in each week.

For the continuous treatment: 0.00004 to 0.0001 gram ($\frac{1}{625}$ to $\frac{1}{650}$ grain) of digitalin [= 0.04 to 0.1 gram ($\frac{2}{3}$ to $1\frac{1}{2}$ grains) of leaf] every day.

The reader is referred to Part I of this work (*Digitalis*) for pharmacologic details. The following table shows the equivalent dosage of various digitalis preparations in different amounts:.

	MASSIVE DOSE.	SMALL DOSE.	VERY SMALL DOSE.
Fresh digitalis leaves	0.6-1 gram (10-15 grains)	0.1-0.2 gram ($1\frac{1}{2}$ -3 grains)	0.02-0.04 gram ($\frac{1}{3}$ - $\frac{2}{3}$ grain)
French digitalin ..	0.0006-0.001 gram	0.00006-0.0001 gram	0.00005-0.0008 gram.
Digalen	3-6 c.c. ($\frac{3}{4}$ - $1\frac{1}{2}$ fluidrams)	20 to 50 drops.	5 to 15 drops.
[Tincture	6-10 c.c. ($1\frac{1}{2}$ -2 $\frac{1}{2}$ fluidrams)	1-2 c.c. (15-30 minims)	0.2-0.4 c.c. (3-6 minims).]

The subjoined illustration (Fig. 272) shows strikingly the pharmacologic action of digitalis when properly administered in a case of decompensation. (See also Fig. 1, Vol. I, p. 41.)

II. Course of Treatment in a Case of Lost Compensation.—Like any other morbid condition, decompensation runs an altered course as a result of treatment, and this course should be a favorable one. The treatment must naturally be adjusted to this favorable course. A concrete instance will illustrate this, causing us to retrace in the opposite direction the stages discussed in the preceding sections, in

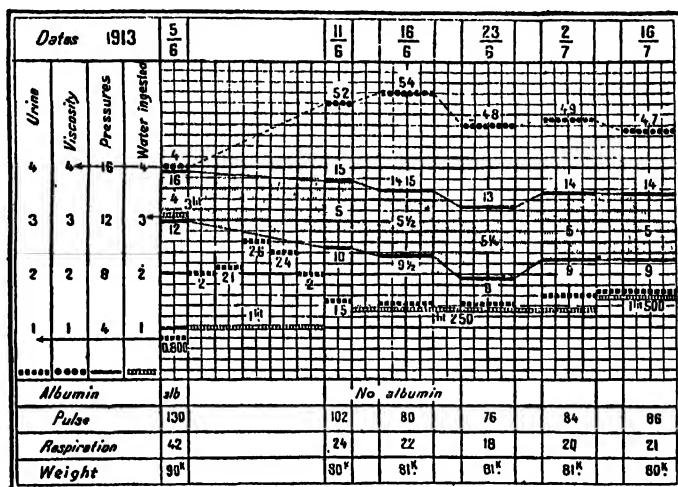


Fig. 272.—Case 51 bis. F., 56 years. Loss of compensation.
(Blood-pressures in centimeters of mercury.)

From $\frac{9}{6}$ to $\frac{9}{11}$. First stage of treatment.
 From $\frac{9}{11}$ to $\frac{9}{23}$. Second " " "
 From $\frac{9}{23}$ to $\frac{7}{16}$. Third " " "
 Thereafter. Fourth " " "

which the period of compensation was taken up first and that of failure last.

The typical case, No. 51 bis, of which I reproduce both the general curve and the polygraphic tracings obtained in three different stages of the case (Figs. 272 to 275), is especially instructive. This woman, aged 56 years, came to me in June, 1913, in a state of complete decompensation, with rapid, irregular pulse, oliguria, dyspnea, edema, congestion of the bases of the lungs up to the midscapulae, enlargement and tenderness of the liver and slight ascites. She had been suffering for some time from this condition, had been placed on the usual 3 liters of milk a day, with digitalis, and her condition had

grown worse. The pulse pressure was 40 mm. Hg and the blood viscosity, 4.

The treatment instituted was as follows:

FIRST STAGE:

1. Rest in bed.
2. Water and infusion (800 c.c. on each of the first two days, in four divided amounts).

Skimmed milk (1 liter on the succeeding days, in four portions).

3. \mathcal{R} Scillæ,
Resinæ scammoniaë,
Digitalisāā 0.05 gram (gr. $\frac{3}{4}$).

Ft. pil. No. i. Da tal. No. xx.

Sig.: Four pills a day for five days.

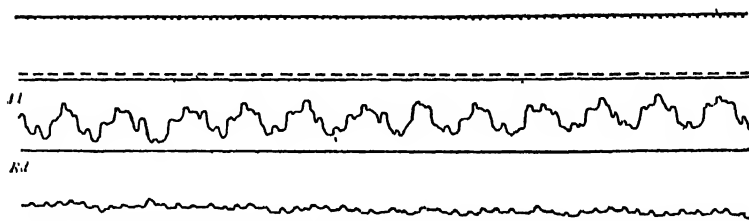


Fig. 273.—Case 51 *bis*. F., 56 years. Weight, 90 kilos.
6/5/13, 1 P.M. Pulse, 130. Pressures, $160\frac{1}{2}/120$. Viscosity, 4.
Urine, 800 c.c.; traces of albumin.
Jd, right jugular.—*Rd*, right radial.

4. Thirty cups daily over the kidneys, lumbar regions, chest and liver, including eight wet cups on the first two days.

The results are shown in the diagram: A marked diuresis occurring at the same time as the pronounced reduction of fluid intake. In five days, from June 5th to June 11th, while 5 liters of fluid were taken in, $13\frac{1}{2}$ liters passed out as urine, in addition to an undetermined amount with the stools; the loss of weight was 10 kilograms (22 pounds), corresponding beyond a doubt to the loss of water from the tissues. At the same time, the diastolic pressure receded and the pulse pressure and blood viscosity rose. The edema and albumin disappeared, the pulse-rate was lowered, dyspnea subsided and the liver was decongested.

SECOND STAGE:

1. Rest in bed, on an armchair, then walking about the room.
- Massage and passive movements of the lower extremities.
- General rubs.

2. Milk, 1 liter; coffee or tea, 250 c.c.; rice, tapioca, jam, in four small meals at regular intervals.

3. *Tuesday, Thursday and Saturday:*

At 10 a.m. and 4 p.m., one of the following pills:

℞ Sparteinæ sulphatis, 0.05 gram (gr. $\frac{3}{4}$);
 Strychninæ sulphatis 0.001 gram (gr. $\frac{1}{65}$).
 Ft. pil. No. i. Da tal. No. vi.

Monday, Wednesday and Friday:

At 10 a.m. and 4 p.m., one of the following cachets:

℞ Sodii benzoatis,
 Theobrominæ sodio-salicylatis 0.5 gram (gr. viiss).
 Ft. cachet. No. i. Da tal. No. vi.

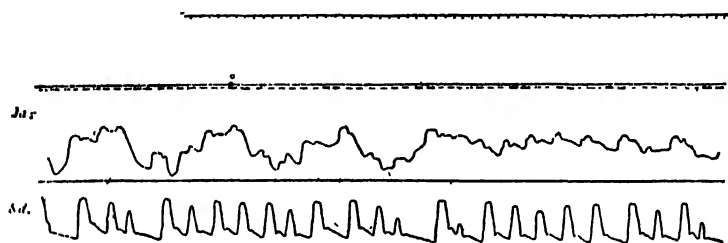


Fig. 274.—Case 51 bis. F., 56 years. Weight, 80 kilos.

6/10/13, 2 P.M. Pulse, 102. Pressures, $150/110$. Viscosity, 5.2.
 Urine 1500 c.c.; no albumin.

Jd, right jugular.—*Rd*, right radial.

4. Twelve dry cups daily over the liver and lungs.

Under these measures, as will be noticed, the condition became stabilized, ingesta and excreta balanced, and the blood-pressure and viscosity drew closer to the norm, without, however, quite reaching it.

THIRD STAGE:

1. The same diet was continued, with addition to the noon meal of 50 grams of fowl or broiled beef, 2 spoonfuls of jam, 30 grams of bread and a cupful of infusion.

2. The patient was allowed to go down into his garden and walk about.

Massage and passive movements were continued, with addition of a few active movements (flexion, extension and elevation of the legs; flexion, extension, raising and lowering of the arms).

3. A three-day course of the above-mentioned squill, scammony and digitalis pills was given (four pills a day), followed by a brief course of theobromine (1 gram—15 grains—a day).

4. General rubs on alternate days.

Dry cups on the intervening day.

FOURTH STAGE:

1. Return to a *moderate, mixed diet*, low in water, chlorides and proteins.

Breakfast: 250 c.c. of tea or coffee with milk and crackers.

Noon meal: Broiled or roast beef or lamb without sauce: 80 to 100 grams.

Purée of boiled fresh or dried vegetables with a little fresh butter, one pinch of salt and lemon juice before serving.

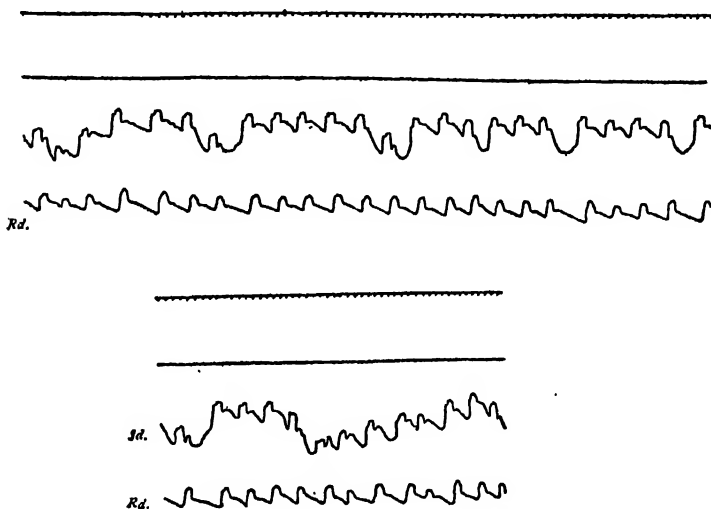


Fig. 275.—Case 51 bis. F., 56 years. Weight, 80 kilos.

7/16/13. Pulse, 86. Pressures, $140/90$. Viscosity, 4.7.

Urine, 1500 c.c.; no albumin.

Jd, right jugular.—Rd, right radial.

Fresh fruits in season.

Or small tarts or cookies.

Bread, 40 grams.

Infusion, 200 c.c.

4 p.m.: 200 c.c. of weak tea with sugar and one cracker.

Evening meal: 250 c.c. of milk soup.

Vegetable.

Fruit.

Infusion, 150 c.c.

Bread, 40 grams.

Salt sparingly in the kitchen, forbidden at the table.

With the water contained in the foods, this diet represents about 1600 c.c. of water; about 1400 c.c. pass out with the urine.

2. The patient was allowed to go out walking for increasing periods up to $\frac{3}{4}$ hour in the morning and $1\frac{1}{2}$ hours in the afternoon, with rests, at first on level, then on slightly rising ground.

The rubs, massage and active movements were continued.

3. Dry cups were applied once a week.

4. Twice a *week*, on retiring, one or two *aloin pills*.

Twice a *week*, at 10 a.m. and 4 p.m., a cachet of 0.5 gram ($7\frac{1}{2}$ grains) each of theobromine sodio-salicylate and sodium benzoate.

Twice a *week*, at 10 a.m., 0.00025 gram ($\frac{1}{200}$ grain) of crystallized digitalin [= 0.25 gram (4 grains) of digitalis leaf].

Under this treatment the circulation and general nutrition remained in a state of satisfactory balance. There was present, however, a manifest tendency to a high pulse-rate and irregular pulse, due to auricular fibrillation. The circulatory condition, while sufficient, was unstable, and the cardiac reserve power undoubtedly small.

The above case is a good illustration of the continuous adaptation of the treatment to changes occurring in the clinical condition.

* * *

Cardiac failure is nearly always associated with renal insufficiency, temporary or permanent. Where the renal impairment is mainly of the azotemic type, I have always found it advantageous to begin the treatment with the therapeutic triad: Bed, water, and saline purgation, bringing into play a classic combination of measures which Guelpa has of late championed anew with commendable energy and persuasive power.

The measures to be prescribed are:

1. Absolute rest in bed.
2. Water and infusions (1 liter in four divided amounts).
3. Rubinat mineral water, one large glassful.

The subsequent treatment is similar to that already described.

The annexed illustration (Fig. 241) summarizes another typical instance of adaptation of the treatment to changing clinical conditions in a case of failing heart.

III. Cardiac Insufficiency which is Refractory or Difficult to Relieve.—There is a certain proportion of cases which make up this category.

For the last time allusion will be made to the cases which are refractory only by reason of **improper treatment**. The fundamental rules to be followed are:

1. Absolute rest in bed.
2. Restriction of food and, more particularly, of fluid.
3. Removal of the peripheral barrages, to wit:
 - (a) Depletion of the lungs, kidneys and liver by wet cupping.
 - (b) Evacuation of pleural or ascitic transudates.
 - (c) At least partial removal of edema by punctures or subcutaneous drainage.

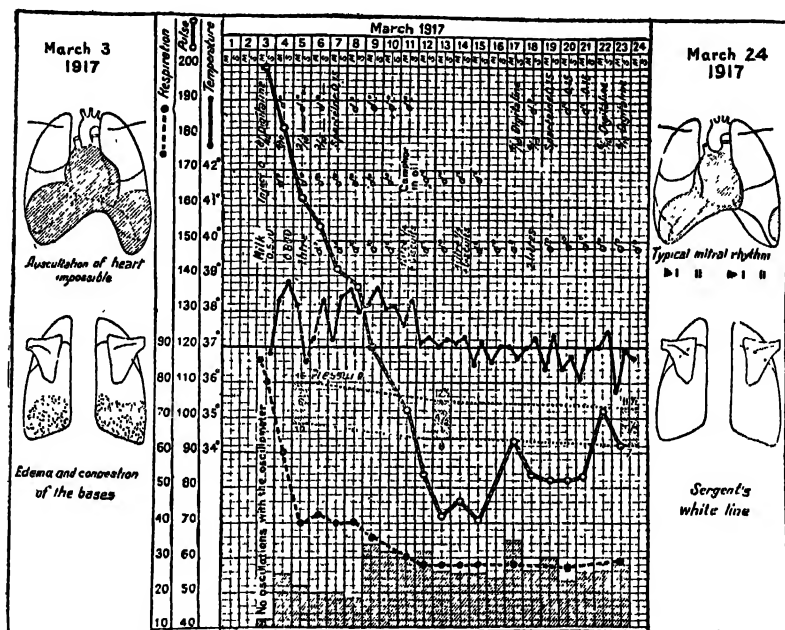


Fig. 276.—Case 826. Loss of compensation; auricular fibrillation; mitral stenosis.

H., born 1888. Height, 164 cm. Weight, 57 kilograms.

4. Administration of a suitable preparation of digitalis in appropriate dosage and under appropriate conditions.

(a) The official preparations of digitalis, especially the powder [and tincture], and the French crystallized digitalin may be recommended.

(b) The APPROPRIATE DOSE naturally depends on the condition of the myocardium, but very often unwarrantably cautious dosage is employed. With the foregoing pre-requisites duly attended to, 1 gram (15 grains) of the powdered leaf, or 0.001 gram ($\frac{1}{65}$ grain) of French digitalin constitutes the "massive dose" which may be suitably given in from one to three days, according to indications. It may be neces-

sary to increase these doses to 1.5 grams ($22\frac{1}{2}$ grains) or 0.0015 gram ($\frac{1}{44}$ grain), taken in three days.

[For the small dose, large dose and Eggleston methods recognized of late in America, see Vol. I, pp. 45 and 46.]

(c) Under APPROPRIATE CONDITIONS:

An upset gastro-intestinal tract and hepatic congestion are conditions unfavorable to the absorption of digitalis preparations from the intestine. In these cases, therefore, the first thing to be done is to decongest the liver and digestive canal by restriction to water, purgation and wet cupping; only then should the digitalis be administered.

The *intravenous route* should be resorted to. From 0.00025 to 0.0005 gram ($\frac{1}{200}$ to $\frac{1}{130}$ grain) of crystallized digitalin (in the form of 0.25 to 0.5 c.c. of the official 1:1000 solution) may be given dissolved in 10 to 20 cubic centimeters ($2\frac{1}{2}$ to 5 fluidrams) of physiologic salt solution or distilled water, two or three days in succession.

Such medication, with adjunct measures such as camphor in oil, hypodermic injections of oxygen gas and cardiac organotherapy, has always been sufficient in my experience.

5. Heart peptone in daily amounts of 1 to 10 grams (15 to 150 grains) in powder form or in an elixir, is often a useful adjunct to heart- tonic medication.

Apart from the above cases, there remain instances of *really irreducible cardiac insufficiency*, which are irreducible because the heart, having exhausted all its reserve power, cannot respond to the medication—where, for example, excessive dilatation of the organ exists as an indication of complete asthenia of the myocardium.

Camphor in oil, strychnine, hypodermic injections of oxygen gas, cardiac organotherapy and mechanical, thermal or galvanic stimulation or étincelage of Head's cardio-aortic zones including the inner aspects of the arms and forearms, variously combined, have sometimes yielded remissions and material improvement in cases of this type in my experience.

Surgery has been resorted to in a certain number of cases, mainly under two sorts of conditions:

1. In cases with *pericardial adhesions*.—Brauer, of Heidelberg, suggested that the work of the heart be facilitated by mobilizing the precordial costal wall (*Brauer's operation*). The procedure consists essentially in resection under procaine-adrenalin anesthesia of the 5th and 6th ribs and costal cartilages on the left side for a distance of 7 or 8 centimeters ($2\frac{1}{2}$ to $3\frac{1}{2}$ inches). Brauer, Delbet and Donay, Braillon and Caraven, and others have reported favorable cases and demon-

strated the feasibility of treatment by thoracotomy in cardiac insufficiency dependent upon the presence of costo-pericardial adhesions.

2. In cases of partial ossification and consequent mechanical immobilization of the chest, met with sometimes in *emphysema* and in *pleuro-pulmonary fibroses*, a more or less extensive *chondrectomy* (*Freund's operation*) may exert a favorable effect on the secondary heart disturbance by permitting mobilization of the chest and facilitating the work of the heart and the evacuation of the chambers of its right side. A few favorable cases have been reported by the authors already referred to (see *Emphysema*).

IV.—TREATMENT OF COMBINED CARDIAC INSUFFICIENCY.

A.—CARDIO-RENAL SYNDROMES.

Reno-cardiac syndromes with high blood-pressure.

Cardio-renal syndromes, with secondary passive renal congestion.

Terminal syndromes—combined heart failure and uremia.

Cardio-renal insufficiency.

The course of the cardio-renal syndromes with high blood-pressure may well be divided, as suggested by Castaigne, into three stages:

1. **Stage of Cardiac Compensation in Chronic Nephritis with High Blood-Pressure.**—This period is characterized by persistent albuminuria, polyuria, frequent urination, the minor evidences of Bright's disease, and in particular, persistently high blood-pressure. These patients exhibit no disturbances of function of cardiac origin.

The *treatment* should be chiefly hygienic and prophylactic, *viz.*, that already described in the section on the *Preventive Treatment of Cardiac Insufficiency*. In addition, however, stress should be laid on:

1. General restriction of fluids (at most $1\frac{1}{2}$ liters a day).
2. The need of a chloride-free, or at least, a low-chloride diet.
3. The utility of frequent (monthly) depletive treatment over the lumbar region (wet cupping).
4. A more rigid general hygiene, since here the heart and kidneys are both handicapped.

2. **Attenuated Form of Left Ventricular Insufficiency.**—The patients constituting this group exhibit the same symptoms as do those of the preceding category, but in addition show the functional and physical signs of insufficiency of the left side of the heart: Dyspnea, palpitations, anginal pains, asthmatic attacks, dilatation of the left heart, gallop rhythm and increased heart-rate.

The treatment should be that already described for *Relative Cardiac Insufficiency*.

In addition to the measures previously alluded to (restriction of fluids, chloride-free diet, wet cupping to the lumbar regions and general hygiene), there should be ordered:

1. A continuous reduced diet *low in proteins and chlorides*, and on one or two days a week, a more stringent diet with rest at home (either 1 liter of milk in four divided amounts at regular intervals or a strict fruit diet). These diets, however, should be taken under rather close supervision, the scales, sphygmomanometer and urine graduate being, in particular, watched; any excessive drop of weight or blood-pressure accompanied by weakness and reduced urinary output should be followed by an increase in the allowance.

2. *More copious and more frequent blood-letting*, especially in cases with very high blood-pressure (wet cupping in the lumbar and hepatic regions, vein punctures, actual venesections, leeching).

3. Systematic *intestinal derivation*, consisting in the use of *aloes* or *scammony* regularly two or three times a week.

4. *Alternate courses* of heart-tonics, sedatives, vasodilators and, if need be, diuretics. For example, treatment may be prescribed thus:

For ten days in each month:

Crystallized digitalin, 0.0001 gram ($\frac{1}{650}$ grain) once daily [= 0.1 gram ($1\frac{1}{2}$ grains) of digitalis leaf].

For the next ten days:

A preparation of valerian, taken morning and evening (not with meals).

For the last ten days:

Theobromine, 0.4 gram (6 grains) in the morning on awakening and again on retiring, with a half-glassful of Vittel water.

This plan is to be followed for two or three months, or may be repeated every two or three months.

3. **Paroxysmal Form of Left Ventricular Insufficiency.**—These patients are such as have gone through repeated attacks of angina pectoris, cardiac asthma and even acute pulmonary edema. These disturbances have ceased since functional mitral insufficiency has set in.

The treatment to be instituted is that already described for acute decompensation. Sometimes these cases are among the refractory, particularly threatening or irreducible group.

They may require the most energetic measures:

1. Copious venesection, 300 to 600 c.c. (10 to 20 ounces).
2. Intravenous injections.

In such cases I have always injected intravenously either a suitable preparation of digitalis or the French digitalin, 0.00025 to 0.001 gram ($\frac{1}{260}$ to $\frac{1}{63}$ grain) in the form of the 1:1000 solution mixed with 10 to 20 cubic centimeters ($2\frac{1}{2}$ to 5 fluidrams) of distilled water, or better, of physiologic salt solution.

Camphor in oil, adrenalin, strychnine and hypodermic injections of oxygen gas have sometimes proven valuable adjuncts.

* * *

Intravenous injections of strophanthin, abandoned for a time on account of the reports of rather numerous deaths following the procedure, have regained some popularity of late as a result of the contributions of Vaquez, Castaigne, Laubry and others. (See Part I: *Strophanthus*.)

Ouabain (Arnaud), alone recommended by these observers, is a glucoside obtained from *Strophanthus gratus*. Vaquez summarizes its properties thus: "It is no more toxic than amorphous strophanthin, and is as easily used as [French] digitalin; we have used it 2000 times without ever witnessing any serious effects."

The mode of administration is intravenous injection, and the active dose 0.0005 gram ($\frac{1}{200}$ grain), dissolved in 1 cubic centimeter (16 minims) of water. The solution should be sterilized at 110° C. for an hour and should be fairly recent (less than three months old).

The number of injections should not exceed three or four, once daily. After a week's rest another course of injections may be given if the patient's condition should require it.

It is well to be very cautious, as a considerable number of fatalities have been reported.

Ouabain can also be given by the mouth, and is in some degree effective when administered.

4. Where the **renal insufficiency combined with the failing heart is mainly azotemic in type**, I have always found it advantageous to begin the treatment with the therapeutic triad: Bed, restriction to water, and saline purgation:

1. Absolute rest in bed.
2. Water and infusion (1 liter a day in four divided amounts).
3. Rubinat mineral water: One large glassful.

The rest of the treatment is similar to that described above.

B.—CARDIO-PULMONARY SYNDROMES.

Cardio-pulmonary syndromes: Secondary passive congestion of the bronchi and lungs; cardiac bronchitis; cardiac asthma.

Pneumo-cardiac syndromes: Heart disturbances secondary to a previous lung disorder.

Cardio-pulmonary insufficiency: Failing heart with anoxemia.

The intimate physiologic relationship between the heart and the lesser circulation is manifested clinically in the combination of disorders of the heart and lungs.

Heart disturbances with inadequate compensation almost invariably react on the broncho-pulmonary apparatus, inducing therein passive congestion with edema often complicated by active hyperemia of threefold origin—reflex, toxic, vasomotor, and infectious (usually pneumococcic). These facts relating to pathologic physiology should always be kept in mind in the treatment of these disorders.

Again, the chronic lung diseases, by reason of the obstruction they set up in the lesser circulation, force the heart, especially its right side, to an excess of functional activity which the heart muscle is in many instances unable to withstand.

Cardio-Pulmonary Syndromes.—Lasèque's clear-cut classification of these disorders into *mitral bronchitis* and *aortic bronchitis* will be followed here.

A brief discussion of *cardiac pleurisy* will be added.

MITRAL BRONCHITIS.—This condition is commonest in cases of mitral disease, but is in reality a result of any form of chronic weakness of the heart, of which the lungs constitute merely a sort of a diverticulum. Mitral bronchitis is, on the whole, simply a form of heart failure with broncho-pulmonary localization. It presents itself clinically in the guise of a chronic bronchitis, passive congestion and edema of the bases of the lungs. The patients are of the dyspneic, cyanotic type.

The treatment should consist mainly of:

1. Fundamental treatment of the cause:

(a) Rest.

(b) Reduced diet.

(c) Administration of heart-tonics, especially *digitalis* (with strychnine, sparteine and ergotin as adjuncts).

2. Adjunct treatment:

(a) Chest depletion and counterirritation: Mustard packs, dry cupping and wet cupping over the chest.

(b) Measures for the prevention of infection: Disinfection of the upper respiratory tract (antiseptic inhalations, gargles, nasal oils or ointments, etc.).

(c) Eupneic and expectorant remedies: Iodides, sodium benzoate, sulphurated antimony, etc.; caffeine, adrenalin, etc.; hydrastis.

(d) Opiates to be used for the cough only with great caution and moderation, as they sometimes increase the passive congestion.

(e) Hypodermic injections of oxygen gas are sometimes of the greatest service, especially in the cases with marked cyanosis.

AORTIC BRONCHITIS.—This condition is due much less to the disease of the sigmoid leaflets and the weak heart action than to irritation of the peri-aortic nerve plexuses causing reflex vasomotor disturbances in the broncho-pulmonary structures and to the arteriosclerosis and renal insufficiency, which are always present, causing toxic disturbances; it is chiefly manifested in the form of hyperemic disorders.

The clinical picture is much more nearly that of active hyperemia, of acute edema, of cardiac asthma or of angina pectoris. These are cases of dyspnea with pallor.

The fundamental treatment is mainly an arterio-renal treatment:

(a) Restriction to water, then a milk diet, then a diet of milk, vegetables and fruit, then a moderate mixed diet, with some special days of restriction to water or milk diet or fruit diet in each week.

(b) Blood-letting, either local (wet cupping over the kidneys) or general (venesection or vein puncture).

(c) Cautious specific treatment in known or probable syphilis.

The adjunct treatment is mainly symptomatic:

(a) Morphine (exceptionally) for intense dyspnea or pain.

(b) Aortic counterirritation (small blisters, cautery) in the presence of retrosternal pains symptomatic of pronounced peri-aortic lesions.

(c) If needed, eupneic drugs, used cautiously (iodides, sodium benzoate, caffeine, codeine).

Diuretics: Theobromine, adonis.

Antispasmodics: Valerian, bromides.

(d) Hot arm-baths.

COMBINED MITRAL AND AORTIC CARDIAC BRONCHITIS.—The foregoing typical forms are met with rather frequently. In the advanced stages of arteriosclerosis or of aortitis, myocardial degeneration makes its appearance, and with it a complex syndrome combining the broncho-pulmonary manifestations of heart failure and uremia, of mechanical stasis and of the reflex and tonic vasomotor active hyperemias. Progressive and irreducible heart failure is usually the ultimate result.

In the treatment, the agencies already referred to should be combined as seems best.

Hypodermic injections of oxygen gas, blood-letting, restriction to water or a milk or fruit diet, heart-tonics (digitalis, strophanthus, strychnine, sparteine), diuretics (theobromine, caffeine) and purgatives (aloes, salines, calomel) are the agents most generally indicated. It is in this complex type of case that the true clinician reveals his qualities: Knowledge, refined judgment and ingenuity.

Pneumo-Cardiac Syndromes.—In the advanced stages of the chronic lung disorders (fibrosis of the lungs, emphysema, chronic bronchitis), the right heart yields and relative heart failure sets in gradually and progressively.

There is little to be said as to the treatment, other than that it should combine that of the causal disorder (emphysema, chronic bronchitis) with that of the cardiac insufficiency.

Let us take as a typical instance a case of **emphysema complicated with progressive cardiac insufficiency.**

In addition to the usual treatment for emphysema (*q.v.*) we should prescribe the following measures:

1. From one to four times a month, according to indications, four to eight wet cups are to be applied over the lower chest, the lumbar region or the liver region.

2. On one or two days in the week:

- (a) Absolute rest in the bedroom (in bed or on a couch or armchair).

- (b) Strict milk diet: $1\frac{1}{4}$ liters to be taken in four divided amounts at 8 a.m., noon, 4 and 8 p.m., or, if the patient prefers, a fruit diet.

- (c) Ten to thirty drops of the 1:1000 French digitalin solution, according to indications [$=0.2$ to 0.6 gram (3 to 9 grains) of digitalis leaf].

3. At a later stage of the heart condition, intravenous injections of digitalin or strophanthin may be given.

4. In a patient who is still robust, with pronounced immobilization of the chest because of chondro-costal ankylosis, recommendation of Freund's mobilizing operation (chondrectomy) would be justified.

Cardiac Pleurisy.—This condition occurs on the right side in eight out of ten cases.

It may be due to a number of causes (subpleural infarction of the lung; infection superadded to a congestion primarily of mechanical origin).

The practical points to be kept in mind are these:

1. The frequency of these cases of pleurisy, which are always overlooked because they are "silent," as a rule.

2. The great advantage to be gained by puncturing as often as required in these cases.

They show little tendency to spontaneous resolution.

They always aggravate the pneumo-circulatory difficulty.

The relief obtaining by puncturing, especially as regards the dyspnea, is out of proportion to the amount of fluid withdrawn (generally a few hundred cubic centimeters).

Precisely the same can be said of **hydrothorax**, which, while it is distinguished from the preceding condition by the non-inflammatory character of the fluid (as shown by Rivalta's test) and in being the result of less definite causes, is met by the same indications: Paracentesis thoracis as often as may be required.

V.—TREATMENT OF ANGINA PECTORIS.*

If one accepts as a definition of angina pectoris "a paroxysmal attack of pain relating to the circulatory system, in the course of which the pain, generally retrosternal, may radiate toward the shoulders, back of the neck, arms, most commonly on the left, sometimes on the right, and be accompanied by a feeling of constriction of the chest with dyspnea, anxiety and at times a sensation as of impending death;"

And if one observes and follows up many cases subject to these attacks;

And lastly, if one looks through the extensive literature which has accumulated in all countries and in all languages on this subject:

One cannot escape the conclusion that the condition is a **syndrome devoid of specificity**, not at all unusual, appearing in varying clinical forms (angina *sine dolore*, true and pseudo-angina, etc.) and in which, according to the case, pathologic and pathophysiologic studies reveal the following factors, singly or variously combined:

(a) *Aortic factor*, related especially to the root of the aorta, and which may be either functional (distention due to excessive pressure or reactive spasm) or organic (specific, gouty, sclerotic, atheromatous or ectasic aortitis). It is upon this aortic and peri-aortic element that the pain mainly depends.

(b) *Myocardial factor*, closely connected with the preceding conditions; coronary ischemia, excessive pressure due to spasm, and reduced cardiac reserve power may combine their action to bring on a fatal attack.

(c) *Coronary factor*, functional (reflex spasm) or organic (coronary arteritis, embolism or thrombosis), resulting in myocardial ischemia.

By either dissociating or combining these various pathologic and pathophysiologic components, one can obtain the whole clinical scale of the anginas, from the neuropathic reflex, vaso-vagal, mild forms of angina improperly termed pseudo-angina to the grave anginas dependent upon aortic and coronary degeneration.

* For further details, see MARTINET: "*Les angines de poitrine*," Paris, Masson et Cie., 1922.

ANGINA PECTORIS (PATHOGENESIS).

Neuro-vascular Component (Angiospasm).

Conjointly { nervous: *Sympathetic overactivity, predominantly in cervical region.*
vascular: *Aortico-coronary spasm.*

Causes:

FUNCTIONAL.—Emotive: *Anxiety the psychic primum movens.*
Reflex: *Visceral, dental, gastric, etc. (in those predisposed).*
Toxic: *Tobacco, adrenalin.*

ORGANIC. —Aortitis, coronary arteritis (?).
Periaortitis, mediastinitis.
Neuritis of sympathetic.
Cervicodorsal osteoarthritis.

Myocardial Component { Distention of left ventricle.
Exhaustion of reserve power.

Causes { Degenerative myocarditis in general.
Extracardiac mechanical causes (*aërophagia*).

Prognosis:

If the reserve power of the heart is good: Attacks not dangerous.

If the reserve power is poor: Attacks serious or fatal. { Acute edema.
Heart failure.

ANGINA PECTORIS (TREATMENT).

Etiologic Treatment.

Infection.—*Specific treatment in syphilitics.*
Anti-infectious treatment where there is infection.

Toxic Factors.—*Withdrawal of toxic agents: Tobacco, alcohol, lead.*
Detoxication treatment in diathetic subjects: Gout, diabetes,
etc., also reduction, purgation, diuresis, etc.

Neurosis.—*Psychotherapy, hydrotherapy.*

Pathophysiologic Treatment.

Spasm: *Antispasmodic treatment; sedatives to the nervous system.*

High blood-pressure: *Hypotensor treatment; reduction, sedatives, venesection, etc.*

Plethora: *Reduction cures, blood-letting.*

Pain: *Analgesics: Morphine, antipyrin, acetylsalicylic acid. Counterirritation.*

Cardiac insufficiency: *Rest, heart-tonics* { Digitalis.
Organotherapy.

Coronary ischæmia: *Vasodilators: The nitrites.*

Aërophagia: *Antidyspeptic treatment; promotion of gastric evacuation.*

Anatomicopathologic Treatment.—*Sympathectomy [and other nerve operations].*

There is not a single angina pectoris, but *angina pectoris*, varying widely in gravity and in form, and which one will have little chance of treating successfully unless one investigates carefully:

1. The *pathologic features*: Diseases of the aorta (aortitis, insufficiency, dilatation), evidences of coronary arteritis and of myocardial degeneration.

2. The *pathophysiologic features*: Distention of the peri-aortic plexuses with radiations; myocardial ischemia and cardiac insufficiency.

3. The *etiologic features*: Syphilis, gout, plethora, obesity, rheumatism, arteriosclerosis, neurosis.

4. The *exciting factors*: Exertion, climbing, overwork, emotions, excesses of various sorts, digestive disturbances (gaseous distention, aërophagia, etc.).

The therapeutic indications will be supplied by the above investigation.

A case of angina can be properly treated only:

1. By eliminating the *exciting causes*:

(a) Interdiction of *tobacco*, coffee and alcohol.

(b) Correction of digestive disturbances, and especially gaseous distention and aërophagia (very important), by an appropriate diet.

(c) Avoidance of overwork, emotions, passions, sexual excesses.

(d) Careful regulation of exercise; interdiction of exercise after meals and in strong winds or cold weather.

2. By treating the *underlying cause, i.e.*, according to the case:

(a) *Specific* treatment, in syphilitics.

(b) *Reduction* treatment in gouty, plethoric or rheumatic subjects.

(c) *Reduction* and *absorbent* treatment in sclerotic cases.

(d) *Sedative* treatment and suggestion in neurotics.

3. By combating the *pathophysiologic factors, i.e.*, according to the case:

(a) Hypotensor treatment, for high blood-pressure; reduction treatment, for plethora; analgesic treatment, for pain; antispasmodic treatment, for arterial spasm.

(b) Cautious use of the nitrites, for coronary ischemia.

(c) Cautious use of digitalis, for cardiac insufficiency.

4. By endeavoring to *cause disappearance of the lesions*, if such exist, alike by the appropriate specific treatment, if the occasion presents, and by local counterirritation (small blisters, cauterizations, etc.).

To present *in extenso* the rational treatment of the anginas would require a review of the whole of cardiac therapeutics, and to treat angina cases properly it is essential for the practitioner thoroughly to realize this fact.

Following are the general rules to which I have been led by twenty-five years' experience. In the treatment of the anginas two very distinct divisions must be recognized:

1. *Symptomatic treatment of the attack.*
2. *Treatment of the cause during the intervals.*

I.—Treatment during the Attack.—In the presence of a *severe attack of angina* the following measures are indicated:

1. Injection into one of the *thighs*, for *sedative, antispasmodic purposes*, of 1 cubic centimeter (16 minims) of the following solution:

℞ Atropinæ sulphatis	0.002 gram (gr. $\frac{1}{82}$);
Morphinæ hydrochloridi	0.1 gram (gr. $\frac{1}{10}$);
Aquæ destillatæ	10 c.c. (f3iiss).

Almost at the same time, injection into the other thigh of 2 or 3 cubic centimeters (32 to 48 minims) of 10 per cent. camphor in oil, as *heart stimulant*.

2. *Mustard pack over the chest*, carried out as follows:

Into a bowl pour 2 liters (quarts) of very hot water and add two handfuls of mustard flour, dip a Turkish towel into it, wring it out well, wrap it around the chest, cover it with oiled silk, hold it in place with a flannel belt, and leave it on for fifteen to thirty minutes, until a distinct hyperemic response of the skin of the chest has occurred.

Immersion of the forearms in warm water, gradually warmed further to 42 or 45° C. (107.6 or 113° F.) or higher, also acts favorably, but less so than the mustard pack.

3. Inhalation of *amyl nitrite* is sometimes useful to gain time. Its immediate, instant action affords the patient only an evanescent, temporary relief, but one which nevertheless allows the attack to subside and the measures already mentioned to act.

One might, on the other hand, use *nitroglycerin* (with or without diacetylmorphine):

℞ Spiritus glycerylis nitratis	gtt. xxx;
Aquæ destillatæ	10 c.c. (f3iiss).

M. Sig.: 0.25 to 0.5 c.c. (4 to 8 minims) to be injected hypodermically.

Or:

℞ Spiritus glycerylis nitratis	gtt. xxx;
Syrupi aurantii florum	37.5 c.c. (f3x);
Aquæ	250 c.c. (f3viij).

M. Sig.: Two or three tablespoonfuls at a dose.

The action of nitroglycerin is sometimes striking, but it is much less certain than that of amyl nitrite by inhalation.

4. In the presence of acute pulmonary edema or dilatation of the left heart, even if it be only a threat, there should be no hesitation in practising

venesection at the bend of the elbow. I have sometimes carried it out in conditions so grave, so desperate, and in patients already so reduced by long standing sclerosis that many colleagues had feared to act, deeming that they "should not give the fatal blow to an already moribund case." As a matter of fact, the procedure always gave an immediate, remarkable result in my experience. I particularly recall the case of the mother of an eminent colleague, who had gotten to the last stage of a sclerous cachexia of long standing, and was anemic, emaciated, bloodless, subject to terrible attacks of angina with acute edema, bloody expectoration, cyanosis and extreme dyspnea. Each time death seemed inevitable and imminent, but each time venesection yielded, in addition to almost immediate relief, a material subsequent improvement and, in the aggregate, prolonged the patient's life by nearly one year. One evening in particular, at 6 p.m., she had a sudden, violent attack of angina with intense dyspnea and later cyanosis, rather abundant bloody sputum, and a large focus of edema occupying the lower two-thirds of the left lung. Two friends called in by our colleague refused to interfere in any way, the patient seemed so near death. I saw her at 8 o'clock, inert, cold, with the extremities moist and cyanotic, the bronchi filled, the pulse at 130, and presenting an agonal appearance. I withdrew 300 cubic centimeters of dark blood by vein puncture, meanwhile having a warm pack applied and an injection of 4 cubic centimeters of camphor in oil given. Steadily the dyspnea lessened and the night passed rather satisfactorily, with a copious stool and free micturition. Next morning at 10 o'clock the patient was warm, with a satisfactory, not unduly hard pulse, at a rate of 98; the bronchi were free, and dyspnea moderate. She lived nearly six months longer.

II.—In the Interval between Attacks.—In the interval between the anginal attacks, but with the patient nevertheless in an ill condition, the treatment should depend upon the cause. Since, however, at least relative insufficiency of the left ventricle has seemed to me to be constant, manifesting itself, among other symptoms, by dyspnea on exertion, rise of the diastolic pressure, a break in the ascending systolic stroke of the sphygmogram, *systematic digitalis medication* has often appeared indicated and has, indeed, yielded very gratifying results—not in the form of the intensive digitalis medication suited for heart failure, but in the form of *digitalis medication in small doses given intermittently*, *vis.*, 0.0001 gram ($\frac{1}{650}$ grain) of French digitalin or 5 to 10 drops of digalen or 0.05 to 0.1 gram ($\frac{3}{4}$ to $1\frac{1}{2}$ grains) of digitalis leaf, given in periods variously disposed according to indications: Ten days in each month, five days in every fortnight, or three days a week.

ANGINA PECTORIS.

Treatment of the Attack.

1. *Calmative, Sedative, Antispasmodic, Analgesic:*
Morphine, or better, the total alkaloids of opium.
2. *Heart-tonic* (not excitant):
Camphor in oil.
Digitalin intravenously; in very grave cases; this is a questionable, dangerous, *exceptional* procedure.
3. *Vasodilator counterirritation:*
Mustard chest pack.
Hot arm baths.
4. *Vasodilator medication:*
Amyl nitrite.
Nitroglycerin; erythrol tetranitrate.
Diffusible stimulant and vasodilator mixture: Ammonium acetate, brandy and ether.
5. *In the event of pulmonary edema:* Free blood-letting.
6. *Psychotherapy:* Calmness, assurance, decision, personal authority.
A steady eye.
A firm hand.
A clear conscience.

In the case of *angina pectoris in aged sclerotic subjects* (arteriosclerosis, arterio-renal sclerosis, etc.), the treatment is similar to that of arterio-renal sclerosis. Relative rest, a greatly reduced diet (low in water, proteins and chlorides) and the systematic digitalis medication above alluded to, in alternation with diuretic cures (theobromine, squill, lactose), meet all the main indications.

In the case of *syphilitic inflammatory aortitis* (one-third of all cases), *specific treatment* is formally indicated. It should preferably be instituted by a combination of mercurial treatment (intravenous injections of mercury cyanide or hypodermic injections of the biniodide or benzoate, etc.) with closely supervised iodide treatment (1 to 3 grams—15 to 45 grains—a day for twenty days in the month). Neoarsphenamin is also very effective in these cases. The effect is often striking, if not on the objective manifestations (auscultation and blood-pressure), at least on the subjective symptoms (angina, mild or severe).

In cases of this kind—as well as in the variety to be next considered—I have often seen advantage in the institution of *violent counterirritation* over the base of the heart, either by the repeated application of small blisters, renewed every five days (followed by dressing of the area with petrolatum containing morphine), or by the permanent cautery, as recommended by Peter. I have sometimes obtained unexpected results from this procedure, as, *e.g.*, in an Armenian whose father and two brothers had died of angina and who, himself suffering from aortitis and subject to

severe anginal attacks, was relieved of them in 1901, 1903 and 1904 upon application of the permanent cautery and remained free of the disorder until 1912.

In the case of *angor in a plethoric, gouty, presclerotic or angiospastic subject*, the treatment should be that of these several conditions. Restriction of the fluid intake is often of great importance in these cases.

An absolutely typical case of major angina with acute pulmonary edema following an intensive hydriatic cure in a gouty patient who was the son and grandson of gouty subjects was completely checked by restriction of fluids and appropriate diuretic and heart-tonic medication.

In a general way, all these individuals who are subject to angina derive benefit from the *small meal method* recommended by C. Fiessinger.

Marked restriction of food and a carefully planned diet are nearly always indicated. This is all the more the case in that dyspeptic manifestations are frequent in these subjects; that, as Huchard and A. Robin have wisely remarked, *angor*, gastralgia, dyspepsia and *aërophagia* constitute a reversible system, and that, while dyspepsia often reacts on the alimentary tract by the production of angina, the latter no less frequently produces reactive effects on the stomach. The anatomic, physiologic and pathologic relationships of the stomach and heart are so close that one need not wonder at such a combination of disturbances. While the danger relates to the heart, one should not for that reason forget to treat the stomach.

Space limitations preclude more than a brief reference to the *angor of aërophagic dyspeptics*, a condition of great practical importance on account of its frequency and the quick and often "extraordinary" results that may be obtained if only it is thought of.

Finally, there is no doubt that in the periods of anginal attacks *absolute rest in bed*, quiet and silence are in themselves therapeutic factors, as Fiessinger has well shown.

Apart from the temporary but obvious action of amyl nitrite, I have not observed very distinct results from the use of nitrites, nitroglycerin or erythrol tetranitrate in the intervals between anginal periods.

The administration of iodides is a routine procedure. They seem to be useful in syphilitics, but are often detrimental in sclerotic cases. In conjunction with the bromides they are nearly always to be recommended in nervous, angiospastic, sphymolabile subjects, in whom one may prescribe:

R Sodii arsenatis 0.1 gram (gr. iss);
 Sodii iodidi,
 Sodii bromidi 10 grams (ʒiiss);
 Aquæ destillatæ 300 c.c. (fʒx).

M. Sig.: One tablespoonful at noon and in the evening during periods of nervous erethism.

The preparations of *valerian* are also very useful.

Lastly, I have often observed, as has F. Heckel, the *sometimes favorable and even practically curative effect exerted on many anginal syndromes by regular, progressive, systematic myotherapy*, even in patients who experience the symptom on walking, climbing or other exertion. The fact seems paradoxical, but nevertheless holds good—and this, not in cases of neuropathic angina, but in cases of serious angina with obvious aortitis.

Tea, coffee, alcohol and especially *tobacco* must, of course, be *interdicted*. Tobacco is perhaps not sufficient in itself to bring on angina, but its use may be very harmful through the intermediation of syphilis or of coronary atheroma.

* * *

The **psychic influence** brought to bear by the physician is of enormous, capital importance in this disorder.

While it is incumbent upon him, with all due gentleness, to warn the patient's associates of the seriousness of the disease—if he deems it serious—even if it be only in order to advise that some one accompany the patient on his walks, that he be not left alone and without possible help at night, and that rational hygienic measures be followed, he must always reassure the patient; this is an essential prerequisite to a possible improvement. Angina pectoris engenders in varying degrees the anxiety, fear and terror of death, and these emotions, in turn, are factors in the angiospasm which bring on the angina. In many anginose patients the attacks are greatly increased in frequency as a result of the "Brother, you are going to die" expressions of the family and the physician. The unfortunate patients are terrorized, and their hearts likewise. They should be reassured in word as well as in deed.

In the case of a mild angina in a young aërophagic neuropath, the aërophagia should be combatted with suitable measures; he should be plainly told of the benign nature of his disorder; the actual existence of angina pectoris should be categorically denied, and a demonstration should be given of the fact that the pain is neither brought on nor made worse by exertion and motion (ordinarily, at least).

In a case of grave angina with aortic lesions, without denying the existence of the syndrome (since he who tries to prove too much proves nothing, and the patient would then lose all confidence), the physician should declare—which is true—that the seriousness of this disorder has been greatly exaggerated; that he knows and has been following and treating for many years persons suffering from the same condition and who, with the customary precautions, are leading normal lives, etc. Finally, it will not be a bad plan to prescribe a partial placebo in the form of a stimulating preparation which the patient will be told acts usually, and at least relatively, as a prophylactic, which he should have always at hand, in his pocket or on the table, and of which he is to take a few swallows when he feels the discomfort preceding an attack, which latter should thereupon either prove abortive or be freed of all element of danger. Generally the patient, thus reassured, has little occasion to use the mixture. I usually prescribe:

R. Ammonii acetatis	4 grams (3j);
Spiritus vini vitis	20 c.c. (f3v);
Syrupi ætheris (2 per cent.)	30 c.c. (f3j).

M. Sig.: To be used in the event of an attack.

Surgical Treatment.—Jonnesco reported two remarkable and suggestive cases of at least partial and temporary recovery from angina pectoris following *resection of the cervical and thoracic sympathetic* (cervical sympathetic chain and first thoracic ganglion), interrupting all communication between the cardio-aortic plexuses and the nerve centers by way of the cardiac nerves. In one case, the excellent results had been maintained for five years. [Coffey and P. K. Brown (*Arch. of Int. Med.*, Feb., 1923) have reported five cases, in four of which the sympathetic below the superior cervical ganglion and the superior cardiac branch were removed, and in the other, the inferior cervical ganglion. Four of the cases were practically free of symptoms two to seven months later. The fifth case died a cardiac death].

Suggestion of such a surgical procedure would actually be justified only where angina pectoris was really refractory and severe. It would be an unfortunate procedure, furthermore, to "sympathectomize" a case of syphilitic disease of the aorta which brief specific treatment would generally cure, or an aërophagic neurotic case which a little dieting and judicious psychotherapy would likewise relieve. *Primo non nocere!*

It is nonetheless a fact that the favorable results obtained in the cases referred to offer much hope for sympathetic and peri-aortic surgery.

Anginoid Syndrome in an Aërophagic, Plethoric Subject.—The condition in this case (see Figs. 277 and 278) was featured by paroxysmal dyspnea with sense of chest constriction, precordial pain and anxiety.

This is a common clinical syndrome in *neurotic subjects who bolt their food*. The nervous irritability (erethism), the absence of evidences of actual cardio-aortic disease, the presence of abdominal gaseous distention and the well-marked gastric air-bubble are—in conjunction with the subjective syndrome mentioned above—the main diagnostic features.

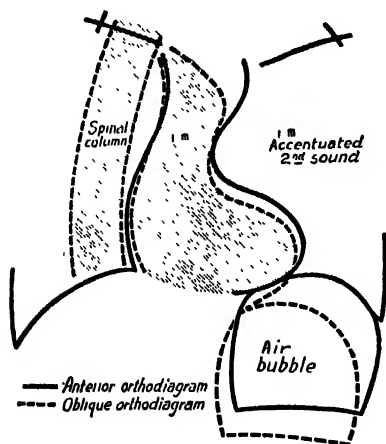


Fig. 277.—Case 3596.—Before any treatment. Anginal syndrome.

H., born 1862. Height, 171 cm. Weight, 76 kilos. Pulse, 100. Pressures, $\frac{230}{125}$.

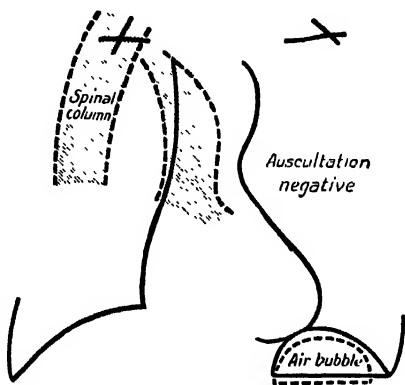


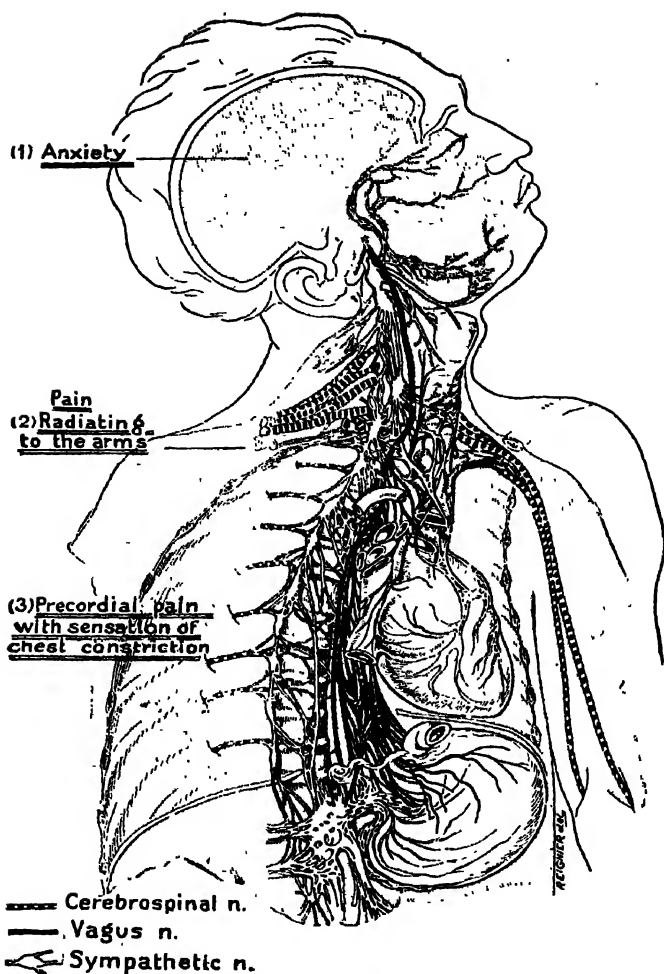
Fig. 278.—Case 3596.—After treatment, three weeks later. Anginal syndrome gone.

Weight, 74.8 kilos. Pulse, 60. Pressures, $\frac{100}{105}$.

Three therapeutic indications:

1. To insure normal evacuation of the stomach by means of a suitable diet and isotonic gastric medication calculated for this purpose.
2. To allay the nervous erethism by tepid hydrotherapeutic measures and, if need be, a nerve sedative.
3. Psychotherapy to allay anxiety—affirmation of the absence of all cardio-aortic disease. Abstention from all medication directed to the heart.

The striking clinical result illustrated in the two orthofluoroscopic diagrams presented herewith was obtained with the following measures:



PATHOGENESIS AND INDICATIONS.

Mental causes: Worry, emotions, anxiety neurosis.

Psychotherapy.

Sympathetic causes: Sympathetic neurosis. Traumatic, organic or emotional angiospasm.

Sedatives. Neurocardiac depressants, valerian, bromides, hypnotics.

Sympathectomy.

Aortic and periaortic causes:

Specific: Specific treatment.

Gouty: Reduction treatment.

Ordinary: Counterirritation.

(Coronary causes: Spasm; angiospasm.)

Myocardial causes: Sudden exhaustion of reserve power.

Heart-tonics: Camphor in oil, digitalis, heart peptone.

Gastric causes: Aërophagia.

Evacuant and antidyspeptic medication.

Visceral causes in general.—Restrain or remove the irritation which is the source of the reflex (fibroma, decayed tooth, lithiasis, etc.).

First three days:

(a) Rest in the room. (b) One liter of lemonade in five divided amounts.

(c) Purgation with sodium sulphate, 40 grams (10 drams), on the first and third days.

In the succeeding weeks:

(a) Gradual return to the normal mode of life.

(b) *A moderate mixed diet*, avoiding fats and fat foods, as well as starchy foods and those made with flour, game, pork products, shellfish, fermented cheeses and all fermentable foods. Careful mastication. Slow eating, at regular hours. Cessation of eating when the appetite is satisfied. Teacupful of anise infusion at the close of each meal.

(c) In the morning on awakening, in the evening before retiring, and, if need be, one hour after meals, a teacupful of warm water containing one teaspoonful of the following powder:

℞ Sodii sulphatis	8 grams (3ij);
Sodii citratis	12 grams (3iij);
Lactosi	180 grams (5vj).—M.

(d) *Tepid hydrotherapeutic measures*: 'Sponge baths, douches, tepid baths.

(e) Progressive physical training:

1. Exercises performed on the floor or other flat surface.
2. Gradually increasing walks on level, then rising ground.
3. Croquet, golf, billiards, horseback riding, bicycle riding, then rowing, swimming, etc.

In the event of an ATTACK:

1. Hot moist compresses over the stomach.

2. ℞ Ammonii acetatis 4 grams (3j);
 Spiritus vini vitis 20 c.c. (f3v);
 Syrupi aetheris (2 per cent.) 30 c.c. (f3j).

M. Sig.: A few swallows if discomfort comes on.

VI.—CARDIAC ASTHMA.

This is, on the whole, rather an indefinite syndrome as far as its exact mode of production is concerned. Clinically, it consists of a *paroxysmal asthmatoid dyspnea complicating disturbances of the pulmonary circulation and cardiac function*. It is frequently accompanied by acute pulmonary edema and is met with oftenest in mitro-aortic disorders.

Like angina pectoris, with which it is often combined, it is one of the most dramatic and serious conditions that may be witnessed. Cardiac asthma may terminate in fatal collapse.

The factors underlying the attack are usually:

1. A pre-existing, persistent cardio-aortic disorder with myocardial impairment.

2. An exciting cause, such as tobacco, alcohol, overwork or emotion.

Prompt and accurate medical intervention is required at the time of the attack. This is not the time to lose one's head, palaver, and apply useless measures.

The course to be followed may be summarized thus:

1. *Bleeding at the bend of the elbow (300 to 600 c.c.—10 to 20 ounces) if the blood-pressure is high, which is the rule.*

2. *Mustard pack about the chest or dry cups (or even wet cups in the event of acute edema)—as many as possible.*

3. *Heart-tonics and diffusible stimulants:*

(a) Hypodermic injection of camphor in oil, of strychnine and sparteine, of oxygen gas.

(b) Intravenous injection of 0.00025 gram ($\frac{1}{200}$ grain) of French crystallized digitalin.

(c) Mechanical or thermal or electric (fulguration) stimulation of the precordial, aortic and internal brachial regions.

(d) Administration of a diffusible stimulant: Ether, brandy, ammonium acetate.

Ammonium acetate, and especially a combination of iodide and caffeine, do very well in these cases. The prescription of ammonium acetate, etc., last formulated, may be ordered given in teaspoonful doses every ten minutes in the event of an attack.

Or:

R. Caffeinæ	2 grams (3ss);
Sodii benzoatis	3 grams (gr. xlv);
Sodii iodidi	5 grams (℥ lxxv);
Syrupi aurantii amari	75 c.c. (f3iiss).

M. Sig.: Two to three dessertspoonfuls one-half hour apart in the event of an attack.

These formulas may be recommended, indeed, in all forms of cardiac dyspnea.

The above plan of treatment is applicable to nine out of ten cases. Clinical observation will, however, add to it certain special indications which the true clinician will always be able to appreciate. Robustness on the part of the patient, plethora, or, on the other hand, debility will demand a more or less abundant venesection. Estimation of the reserve power of the heart and the extent of its dilatation will necessitate more or less prompt administration of the heart-tonics, digitalis, heart peptone and adrenalin; intravenous injections of digitalis should be reserved for the cases in which myocardial

power is not exhausted. The violence of the dyspnea and the intensity of the local discomfort may necessitate the use of morphine, or better, of the soluble total extracts of opium (pantopon), which sometimes prove very beneficial.

THE ETIOLOGIC TREATMENT OF CARDIO-VASCULAR DISORDERS.

Etiology brings a second, very important factor into the treatment of heart disorders.

CARDIOVASCULAR INFECTIONS.

Any of the acute infections may involve the heart.—Acute rheumatism is by far the commonest of the causes of heart infection. It will serve as a type for the description of the treatment of the cardiac localizations of the infections. Next to rheumatism should be mentioned *scarlet fever*, *infectious sore throat* (diphtheria, etc.), *typhoid fever*, and a variety of septicemias and pyemias, especially streptococcic and staphylococcic.

RHEUMATISM OF THE HEART.—The credit of the discovery of rheumatic endocarditis and pericarditis belongs largely to Bouillaud, who formulated certain “laws of coincidence” which have since retained all of their clinical value:

First law: In severe, generalized acute articular rheumatism, coincidence of an endocarditis, pericarditis or endopericarditis is the rule and the converse the exception.

Second law: In mild, partial, afebrile acute articular rheumatism, the absence of endocarditis, pericarditis or endopericarditis is the rule and the converse the exception.

Acute rheumatism is, with cardio-arterial sclerosis, the commonest pathogenic factor of chronic heart disorders.

The foregoing dicta teach us that we should foresee and endeavor to prevent the involvement of the endocardium and pericardium in all cases of severe, generalized acute rheumatism.

The treatment may be divided into three parts, corresponding to three different periods in the disease:

Preventive treatment: At the beginning of severe, generalized acute rheumatism.

Curative treatment: When clinical evidences of acute rheumatic endopericarditis are observed.

Palliative treatment: When recovery from the rheumatism has occurred, a chronic heart disorder remaining.

Only the first two of these stages will be dealt with here, the third having already been considered in the preceding sections.

* * *

From the very onset of severe, generalized acute rheumatism, featured by intense, multiple involvement of joints and the presence of fever, an attempt should be made for **prophylactic purposes** to cut short the attack as soon as possible in order to avoid involvement of the heart.

The best preventive treatment is still *systematic and intensive salicyl medication in divided, sufficiently large doses* (6 to 8 grams—90 to 120 grains—or more a day), this being the only treatment really capable of bringing about rapid resolution of an attack of rheumatism.

Sodium salicylate was at first accused of inducing cardiac rheumatism as well as cerebral rheumatism; clinical experience has clearly shown that such is not the case, but that, on the contrary, salicyl medication markedly reduces the proportion of cases in which the heart becomes involved.

At most should there be conceded a slight neuro-cardiac depressant action, which points to the advisability of combining heart-stimulants, especially strychnine and sparteine, with the salicylates in these cases. But while it may be granted that there is a slight depressant action on the innervation and musculature of the heart, no clinical or experimental observation warrants the belief that any effect whatever is exerted on the endocardium or the pericardium involved in the disease, other than the specific curative action for which the drug is given. Therefore, *salicyl treatment* should be instituted in these cases.

It seems not unreasonable to reinforce the particular, specific action of the salicyl preparations with a general anti-infectious therapeutic effect of the type obtained with the *colloidal metals*. One or more daily injections of 5 to 10 cubic centimeters (80 to 160 minims) of electrargol may be given on successive days, or 3 grams (45 grains) of a 15 per cent. colloidal silver ointment may be rubbed in thoroughly over the cardiac region daily.

Local blood-letting by means of wet cups over the heart is probably a useful procedure to reduce hyperemia in deeper-lying tissues.

A *milk diet* is imperative.

The remainder of the treatment (joint applications, etc.) is the same as has been previously described.

If, in spite of this prophylactic treatment, the characteristic signs of **endopericarditis** appear, the *salicyl treatment should be continued* unless there is myocarditis or acute dilatation of the heart, manifested in dyspnea, anxiety, a tendency to collapse or a frothy and blood-stained sputum.

The *colloidal treatment* should then be instituted by the *intravenous* route; sometimes it yields most brilliant results, but its efficacy is, unfortunately, not constant.

Local revulsion should be practised in the form of wet cupping; fly blisters, dressed aseptically; cauterizations, or tincture of iodine.

I have often been much gratified at the effects of continuous application of a light *ice-bag*, separated from the skin by flannel and kept in place by a tape passed around the neck—especially in pericarditis.

Only very exceptionally does rheumatic pericarditis lead to an effusion large enough to require paracentesis.

Other measures which have been advised and used with a varying degree of success are *injections of antistreptococcus serum* or *injections of Wright's vaccine, i.e., a suspension of killed bacilli* (Achalme's bacillus, rheumatic variety).

These various attempts at bacterial therapy sufficiently illustrate the fact that bacteriologists and clinicians are as yet by no means agreed as to the exact nature of the virus of acute rheumatism; for the injections of antistreptococcus serum are based on the view of acute rheumatism as an attenuated form of non-specific pyemia (Menzer, Chvostek, Sahli, Singer, etc.), while the injections of Wright's vaccine, containing Achalme's bacillus, are based on the view of acute rheumatism as an admittedly specific infection due to the bacillus of Achalme, rheumatic variety (Achalme, Thiroloix, etc.).

The authors of these attempts both offer a number of favorable clinical observations in support of their methods. But the results so far have been inconstant, and the observers referred to recommend the administration of salicyl and colloid medication concurrently with their bacterial products.

* * *

When the acute stage is past, the fever has left, and the heart lesion is in process of fibrous organization, an attempt may be made to accelerate the absorption of the valve exudates or retard and minimize their fibrous infiltration by the alternate administration of *iodides* (0.5 to 1 gram—7½ to 15 grains) and *arsenicals*.

The heart weakness and tendency to partial heart failure should be combatted with the *digitalis* preparations, and the erethism, with *valerian* and the *bromides*.

Prolonged application of counterirritants, such as fly blisters, cauterizations and tincture of iodine, seems to be useful.

Peter was convinced that the application of the "permanent cautery" by means of Vienna paste is of unquestionable efficacy. This is an assertion the truth of which is difficult to determine.

On the whole, the treatment may be summarized as follows:

A. SEVERE, GENERALIZED ACUTE RHEUMATISM BEFORE ANY APPARENT CARDIAC INVOLVEMENT.

Antirheumatic treatment (see *Acute Rheumatism*), and in addition:

1. Daily injection of 10 cubic centimeters (160 minims) of *electrargol*, or daily inunction for twenty minutes with 3 grams (45 grains) of a 15 per cent. ointment of colloidal silver.

2. *Three or four wet cups* to be applied daily over the precordium for three or four days.

B. ACUTE RHEUMATISM WITH BEGINNING ENDOPERICARDITIS.

Treatment of the acute rheumatism, with the salicylate mixture modified thus:

R̄ Sparteinæ sulphatis	0.2 gram	(gr. iij);
Sodii salicylatis	16 grams	(f̄ss);
Spiritus vini vitis	40 c.c.	(f̄x);
Syrupi acaciæ	75 c.c.	(f̄iiss);
Aquæ destillatæ	100 c.c.	(f̄iiss).

M. Sig.: Six tablespoonfuls in the twenty-four hours.

With the addition of:

1. Intravenous injection of 5 to 10 cubic centimeters of *electrargol*.

2. Daily precordial applications of *wet cups*, followed by an *icc-bag*.

3. Injection of Wright's vaccine or antistreptococcus serum (?)

C. RHEUMATIC ENDOPERICARDITIS IN THE AFEBRILE STAGE (beginning mitral fibrosis).

1. Alternate the following two formulas every ten days:

(a) R̄ Sparteinæ sulphatis	0.5 gram	(gr. viiss);
Sodii iodidi	8 grams	(5ij);
Syrupi,		
Aquæ tiliaë	100 c.c.	(f̄iij).

M. Sig.: One dessertspoonful morning and evening.

(b) R̄ Sodii arsenatis	0.1 gram	(gr. iss);
Aquæ destillatæ	100 c.c.	(f̄iij).

S. Sig.: One teaspoonful morning and evening.

2. Daily application over the precordium of:

R Tincturæ digitalis 10 c.c. (f3iiss);
 Tincturæ iodi 100 c.c. (f3iij).

M. Sig.: For external use.

TREATMENT OF SCARLATINAL, TYPHOID, STREPTOCOCCIC OR STAPHYLOCOCCIC HEART INVOLVEMENT.—

This treatment, as well as that of heart involvement in other infections, is in all respects similar to that of rheumatic heart involvement, *vis.*: 1. *Prophylactic treatment previous to any cardiac manifestation*, which corresponds to energetic treatment of the infection itself. 2. *Treatment of the infectious heart involvement*, which, in addition to the foregoing treatment, comprises, if necessary, accentuation of the anti-infectious treatment by the judicious use of vaccines, specific or non-specific serums, colloid therapy, as well as the measures more especially relating to the heart (heart-tonics, counterirritation, and local blood-letting and cold applications). J. A. Capps, of Chicago, treats the infectious endocarditis lenta, a very grave condition, by intravenous injections of sodium cacodylate in ascending doses of 0.06 to 0.26 gram (1 to 4 grains) daily for seven weeks to four months. If diarrhea occurs, the dose is reduced for two or three days. 3. *Treatment of the sequela of infection, which is the same as that of the chronic cicatricial heart conditions*—permanent infirmities hardly susceptible to medical measures, but of which the resulting functional disturbances can be mastered. (See *Cardiac Insufficiency*.)

CRENOTHERAPY IN ENDOCARDITIS.—In the acute stage, and likewise during convalescence, treatment by baths is contraindicated until six months after the onset of the endocarditis. After this, a visit may be made to such spas as make a specialty of the treatment of the rheumatic diathesis.

In cases of rheumatic heart disease in which compensation has been lost, some phases of the heart weakness are in reality the expression of myocardial disturbances of rheumatic origin. Under these circumstances spa treatment of the type afforded at Bourbon-Lancy (see Part I: *Crenotherapy, French Resorts*, Group A) may be of service. On the other hand, the carbon dioxide baths, exemplified by Royat [and Nauheim] act mainly in a mechanical way, stimulating the heart and dilating the peripheral vessels, thus reducing the resistance to be overcome.

Merklen has well demonstrated the efficacy of carbon dioxide baths in *chronic mitral disease with relative cardiac insufficiency* and the favorable results to be obtained from the standpoints of heart tonicity, increased diuresis, diminution of edema and improvement in the dyspnea on exertion. Very often, in this stage, the valvular lesion is complicated

with a constantly high heart-rate and arrhythmia, due to auricular fibrillation. Now, in all cases of such arrhythmia, whether secondary to mitral disease or primary (fibrous myocarditis), carbon dioxide spa treatment, including that obtained at Royat, yields excellent results. [The artificial Nauheim bath may be prepared by mixing and dissolving in a 50-gallon bath sodium carbonate, $1\frac{1}{2}$ lbs.; sodium bicarbonate, $\frac{1}{2}$ lb.; calcium chloride, 3 lbs., and sodium chloride, 2 lbs., and then adding slowly sodium bisulphate, 1 lb. (Hinsdale.)]

In all heart disorders in an advanced stage or growing rapidly worse, all mineral water treatments are contraindicated.

CARDIOVASCULAR SYPHILIS. (See also *Syphilis, Aortitis, Aneurism, Arteritis, Slow Pulse*, etc.).—**Syphilis** is the type of the **chronic infections** with frequent cardiovascular involvement, and will serve as a basis for the present therapeutic description. **Malaria** is in all respects similar, but less common. **Tuberculosis** has relatively little affinity for the circulatory system. Syphilis affects the vessels primarily, producing interstitial and parenchymatous lesions therein. Too much stress cannot be laid on the necessity of early diagnosis and energetic treatment of syphilis; this is the best and only means of obviating these formidable cardiovascular and nervous involvements.

Aortic insufficiency of the Hodgson type, some cases of angina pectoris, the majority of aortic aneurisms and a few cases of myocarditis and endocarditis are of syphilitic origin, and in these cases, if the treatment is applied early, the best results from mercurial and arsenical medication may be hoped for. Intravenous injections of neoarsphenamin may be alternated with mercurial treatment in the form of intravenous injections of mercury cyanide, intramuscular injections of a soluble salt or gray oil, mercuric chloride by the mouth or suppositories of mercurial ointment. This treatment will give the best results in the secondary stage of syphilis, and the Wassermann and Vernes reactions will be of service as guides.

Unfortunately, the cases of aortic insufficiency, aortic dilatation and myocardial degeneration are long standing cases in the tertiary stage and are much less sensitive to the specific treatment, which, however, is always useful. In cases of this kind I have sometimes obtained really unexpected results from mixed mercurial and arsenical treatment. The objective results are generally not pronounced, but the subjective results as regards the dyspnea, angina and precordial pains are nearly always very marked and most gratifying. If, for some reason, intravenous administration of the arsphenamins is not favored, these drugs could be given in an enema in saline solution.

Mercurial medication under supervision seems to me to be subject to very few contraindications if the syphilitic origin of the condition is definitely known. Intravenous injections of mercury cyanide and suppositories of mercurial ointment appear to be the procedures of choice in these cases.

Arsenical medication (arsphenamins) obviously requires greater care, but in my opinion is far from presenting the contraindications which have been regarded almost as established since the earlier trials of salvarsan.

These contraindications were enumerated thus: Aortitis, aneurism of the aorta and great vessels, diseases of the aortic orifice, severe myocarditis, angina pectoris, and very pronounced general arteriosclerosis.

Only the last of these contraindications—general arteriosclerosis—should, to my mind, be now retained, as it implies hepatic and renal insufficiency which renders arsenical treatment dangerous.

As for aortic diseases and angina, these are the very cases in which one will have reason to expect the best results. (This question will be dealt with under *Aortitis*, *q.v.*) The accidents reported have related to intravenous injections of salvarsan in a large volume of fluid. I have observed nothing of this sort with injections of neoarsphenamin in concentrated solutions (only 10 to 20 cubic centimeters). Furthermore, in all cases in which there is a valid reason for being apprehensive in regard to this procedure, nothing is easier than to feel one's way at first by the administration of arsphenamin by the rectal route.

At all events, the objective signs generally observed after intravenous injection of neoarsphenamin are as follows:

Reduction of blood-pressure by 10 to 15 mm. Hg, usually a few hours after the injection, and lasting a few days.

Exceptionally, tachycardia, in one-fifth of the cases; more frequent after intramuscular injections.

Arrhythmia (premature contractions), rarely and of short duration.

Slow pulse more often, exceptionally very marked (perhaps through reaction on the liver—cholemia;—perhaps also through an action on the bundle of His, affected by the spirochete).

Subjectively, especially in neurotic persons, there may be noticed palpitations, precordial pains, and a slight feeling of thoracic constriction, which yield to the administration of a diffusible stimulant.

Personally, I have never observed any untoward results more serious than these.

Iodide medication, often of great service, can be freely availed of only if the renal functions are unimpaired, the blood-pressure only

moderately increased, and the tendency to hydremia slight. It will be advisable, moreover, to test the patient's susceptibility by preliminary administration of small doses, such as 0.25 to 0.5 gram (4 to 8 grains), which can then be increased if well borne.

The iodides are useful adjuncts in doses of 1 to 2 grams (15 to 30 grains) a day. If they are well tolerated, the amount can be raised up to 4 grams (60 grains). Amounts larger than this have rarely seemed useful, in my experience.

Combined Syphilis and Acute Rheumatism.—This combination is particularly likely to be harmful to the cardiovascular system. It cannot be treated too early nor too vigorously.

For the **cardiovascular manifestations of malaria**, quinine and arsenic (sodium arsenate or cacodylate, arsphenamins) would be used. Emetine gave gratifying results in a few of my cases.

CARDIOVASCULAR INTOXICATIONS.

The chief **cardiovascular poisons** are:

1. **Tobacco, lead and alcohol.** Consequently any plan of treatment prescribed for a heart case should almost necessarily include:

Cessation of the use of tobacco.

Withdrawal from occupations involving exposure to lead (plumbers, painters, printers).

Interdiction of alcohol.

The last two of these restrictions are absolute, although it must be admitted that the rôle of alcohol in the causation of arteriosclerosis is quite unproved.

As for the withdrawal of tobacco, it need be absolute only in aortic, anginal, high pressure and angiospastic cases. In valvular disease with good compensation, tobacco may be allowed in moderation if its suppression imposes altogether too much distress on the patient.

2. **Toxic food substances**, disintegration products (purins, amino-acids, etc.), products of putrefaction, and bacterial toxins from the gastrointestinal flora.

Any plan of treatment for a heart case must necessarily include (and this is probably the most important point of all):

A dietary scheme, carefully worked out both as to quantity and quality, with exclusion of foods which are toxic, yield purins or are subject to putrefaction (game, pork products, shell fish, preserved meats, fermented cheeses, etc.) and moderation in the use of meats. Stimulating and purin-yielding foods (tea, coffee, chocolate, spices

and condiments) are to be allowed only in small amounts and according to the patient's observed ability to deal with them.

Careful hygiene of the gastro-intestinal tract, implying, in addition to the diet, rather frequent purgation and the judicious use of substances antagonizing putrefaction (lactic ferments, charcoal, benzonaphthol, etc.).

3. **Bacterial toxins** (diphtheritic, typhoid, colon bacillus toxins, etc.); the only course permissible is prompt and energetic treatment of all infections, of whatever sort.

THE HEART IN METABOLIC DISEASES.

THE HEART IN OBESITY.—Obesity with Cardiac Complications.—Heckel describes in relation to the obese:

A fatty heart with simple overdeposition of fat; with infiltration, dissociating the muscle fibers, or with fatty degeneration of these fibers.

A large heart, either through dilatation of the right heart due to portal hypertension, hepatic congestion or lung disturbances, or through hypertrophy of the left ventricle by reason of arteriosclerosis or arterial nephritis.

An aortic heart.

A nervous heart, through inherited or acquired crethism (intoxication by uremia, tobacco, dyspepsia, alcohol, coffee or tea).

An emotive heart, by reason of neurasthenia, psychasthenia or mere cardiophobia.

A ptotic and atonic heart, occurring in an obese subject whose weight has been reduced too rapidly by a restricted diet and spa treatment or by thyroid medication, without being sustained by a course of exercises.

An arrhythmic heart, fibrous due to myocarditis, or with combined mitral disease and dilatation due to abdominal plethora, "through the resistance offered by the capillary network which is produced in the regions in which fat accumulates.—Every new lobule of fat becomes surrounded by a nutrient capillary. The thick layer of fat infiltrating the body should be thought of as a tissue with a dense vascular network" (F. Heckel).

Distinct Therapeutic Indications in Each Type of Case.—The fatty heart through simple overdeposition of fat, with its sounds somewhat muffled and distant but with the valve sounds retaining their normal relative values, with a normal heart-rate and the normal differences between the systolic and diastolic pressures, is improved by the or-

dinary treatment by restricted diet together with systematic exercise and habituation to walking on hilly ground.

Greater circumspection must be observed as regards gymnastic exercises and sports in obese subjects in whom one may be led to suspect by stethoscopic and clinical examination a fatty infiltration between the fibrillæ, and especially steatosis. In the cases of this last variety the heart-tonics, especially digitalis, become dangerous; in fact, the days of these patients are numbered, and all physical exertion must be forbidden.

The tendency to dilatation of the right heart as a result of portal hypertension calls for the restriction of fluids, withdrawal of blood over the hepatic region, and rather frequent and drastic purgation. The large Traube heart in arteriosclerotics imposes a diet of milk and vegetables and the use of theobromine.

The presence of aortism (atheromatous aortitis, aortic insufficiency with arteriosclerosis, cardiosclerosis, interstitial nephritis) demands especial restrictions as regards exercising, regulation of fluid intake, the use of diuretics and the choice of foods.

Obese patients with nervous hearts, who are often the offspring of gouty individuals or are "incomplete" cases of gout themselves, should be treated more especially with a restricted meat diet, alkalies, and sweating by appropriate physical exercise.

The crethism of the heart may be due to uricemia, to congenital nervous instability, to dyspepsia or to intoxication by tobacco, tea or coffee. Naturally, the suspected cause of the intoxication should be overcome; elimination through the skin and kidneys should be regulated by rubs and diuretics; the patient should be instructed to eat slowly and to avoid ærophagia by not swallowing unnecessarily or too often during the digestive period.

The discomfort and anxiety experienced by the subjects with cardiophobia should be combatted by reasoning the matter out with them, by explaining to them the cause of their malaise, and by making frequent, positive assertions, each time after auscultation, that their heart and aorta show no organic disease, and that the precordial pains, which sometimes account for the cardiophobia, are of neuralgic origin. Mild counterirritation with chloroform compresses or mustard applications should be employed and preparations of valerian and bromides given. If there is tachycardia, cold compresses should be applied over the precordium.

True angina pectoris may show itself in an obese subject, but how rare this is, and how frequent, conversely, are attacks of pseudo-angina in obese neuropaths, especially among women!

In neurasthenic, psychasthenic obese cases, hydrotherapeutic measures, at first hot, then in the form of the Scotch douche, together with diet and exercise to the point of sweating, will be serviceable in combatting the heart condition.

In obese individuals with gastric or intestinal indigestion or colonic disorders, diet, alkalies, laxatives and bowel irrigations will do away with the heart disturbance.

Heckel has rightly laid stress on the heart disorders brought on by ill-advised treatment, *i.e.*, by a too rapid reduction, such as may be produced by an intensive thermal cure combined with massage, drastic purgation, dietary restrictions, unduly prolonged walks and thyroid treatment.

These conditions of atonic heart and ptotic heart are met with in obese patients who have lost more than 6 kilograms (13.2 pounds) a month—and one does see patients who have lost 15 to 20 kilograms (33 to 44 pounds) in six weeks. When, after a few weeks' treatment, the heart-sounds are observed to be rather indistinct, with a small, low tension pulse, some pallor, breathlessness on exertion, appreciable displacement of the apex, and uncomfortable sensations behind the sternum, the treatment should be interspersed with periods of rest and a more liberal diet, consisting of meats and starchy foods in small meals, with breathing exercises and exercises of the lower extremities *in recumbency*, but no walks; and the use of strychnine.

The arrhythmia of obese hearts may be due to heart-block through dissociation of the bundle of His by fat (this is rare: Bergé's case); but generally it is the result of auto-intoxication, yielding to a long-continued vegetarian diet, or of arteriosclerosis with mitral disease, and the customary treatments should be used for the cardiovascular disturbances, dependent either on portal and hepatic hypertension (vegetable cathartics, calomel in small doses, withdrawal of blood over the hepatic region, and restriction of fluids) or on a renal barrage and peripheral arteriocalillary spasms (diuretics, theobromine, milk and vegetable diet).

CARDIOVASCULAR GOUT.—Gout has a marked affinity for the cardiovascular system. The circulatory manifestations of gout are encountered by the clinician under two definite circumstances: 1. As an *angionephric form of gout*. 2. As a *metastatic manifestation of retrocedent gout*.

1. The Angionephric Form of Gout (Le Gendre).—A case of gout may be considered to be of the angionephric type when there appear prominently in it various evidences of disturbed circulatory function such as frequent epistaxis, head congestions, ready susceptibility to

cooling of the hands and feet, angiospasm ("dead finger" phenomenon, partial numbness) and vaso-dilatation, alternating on the slightest provocation; frequent diminution of the output of urine, which often contains but little uric acid, while at other times there are attacks of uratic discharge with renal colic; high blood-pressure, intermittent albuminuria, gallop rhythm, and perversions of cutaneous excretion (dry skin or hyperidrosis, seborrhea), themselves dependent upon defective circulatory and renal functioning.

It is in these angionephric cases of gout, in whom there is a constant tendency toward retention of uric acid and other toxic katabolic products, that one must be the most solicitous about preventing the ingestion of purin-yielding foods or of foods the decomposition of which leads to the formation of ptomains and leukomains. It is in these cases that the diet must be as meatless as possible and that the ideal is, not an exclusive vegetarian diet, but a vegetarian diet with addition of milk and eggs.

If meat is allowed these patients, it should be only in an intermittent fashion, in order to permit a periodic elimination of the residuum of the products of protein disintegration which have accumulated in the system during the period on a mixed diet. Meat should be taken only on alternate days, at one meal, or on two days a week; on the other days milk, eggs, fats and carbohydrates should constitute the whole diet.

During the periods in which there appear certain symptoms of autointoxication (headache, inability to work, somnolence or insomnia, etc.), protein foods must be absolutely forbidden.

These gouty cases of the angionephric type must permanently give up the use of fermented beverages and of the least amounts of alcohol; water, milk, infusions and, perhaps, unfermented grape juice are exclusively suitable for them.

They may be allowed to take coffee, tea and cocoa freely in spite of the purins these beverages contain.

As their renal insufficiency is often progressively tending toward chloride retention, the elimination of salt should be watched and salt restricted or forbidden, if need be.

Thus, for the gouty case of the angionephric type, a meatless diet low in purins, low in salt or salt-free, excluding alcohol, and mainly vegetable with milk and eggs is indicated.

The physician should also take care to see to proper regularity of the central and peripheral circulation and to maintain and activate diuresis.

The vasomotors of the skin should be stimulated and the eliminatory function of the skin glands called upon; the body should be hardened to the effects of cold by periodic rubs over the entire skin surface, for cold, by inhibiting the skin functions, frequently brings on renal congestion and uric retention.

The most strongly indicated spa treatments in these cases are those belonging to the series of the lixiviant diuretics, heart-tonics and alteratives.

2. Metastatic Manifestations of Retrocedent Gout.—These may involve the digestive tract, heart or brain.

(a) If there has been a distinct and suddenly terminated joint flare-up, or at least a perceptible joint disturbance, the first indication is to try to bring on or bring back joint hyperemia, whatever be the situation of the internal organ involved. This is done by means of mustard foot-baths (2 tablespoonfuls of mustard flour in 5 liters of water), the application of mustard poultices, rubbing over the joints of the feet or knees of a stimulating liniment of alcohol, ammonia or turpentine, or hot fomentations.

(b) In the event of cardiac disturbance (palpitations, arrhythmia, collapsed state, etc.): Precordial applications of ice or very hot water, hypodermic injections of 10 per cent. camphor in oil (1 cubic centimeter—16 minims—every two hours), alcoholic drinks, and heart remedies, choosing, according to the principal manifestation, from among sparteine, strychnine, strophanthus, digitalis, convallaria or an alkaline bromide.

TREATMENT OF PERICARDITIS.

In pericarditis, all attempts at **causal treatment** should be based on the following diagnostic considerations:

1. *Infections* are by far the commonest causes of pericarditis, in the following order of frequency: *Acute rheumatism*, and next a wide variety of acute infections (eruptive fevers, typhoid fever, pyemia, septicemia).

2. In the presence of an effusion, the ready feasibility of performing an exploratory (or evacuating) puncture may permit of detecting the pathogenic agent and even of culturing it, preparing an *autogenous vaccine*, and thus trying a rational vaccine treatment.

3. The fact that the pericardium is a serous membrane results in its being found the seat of *gout* and *tuberculosis* much oftener than is the endocardium in endocarditis. These are two interesting possibilities from the therapeutic standpoint, since the first may lead to the syste-

matic use of colchicum and the second to injections of air into the pericardium.

4. The possible occurrence of a *nephritic, azotemic* pericarditis requiring the general treatment for azotemia should not be forgotten.

The causal treatment is manifestly dependent upon the observation of one or another of these possible conditions; it consists simply of the treatment of acute rheumatism, of infections, of gout, of tuberculosis or of Bright's disease, and it seems quite unnecessary, therefore, to give a duplicate account of it here.

Apart from this etiologic treatment, the indications to be met are *purely symptomatic*:

1. To allay the pain and combat the local inflammation.
2. To allay the dyspnea and sustain the heart.
3. To evacuate the effusion (if the occasion exists) and treat the serous membrane.

I. To allay the pain and combat the local inflammation:

Precordial revulsion by means of *wet cupping*, cauterizations, and the ice-bag in case of cardiac erethism.

Application of fly blisters and dressing of the area with an ointment containing morphine sometimes affords much relief.

Effluve treatment might be tried.

II. To allay the dyspnea and sustain the heart:

Hypodermic injections of oxygen gas.

Prescription of a preparation containing ammonium acetate or an iodide with caffeine and sodium benzoate (see *Cardiac Asthma*).

Administration of heart-tonics: Digitalis, sparteine, strophanthus.

Suitable posture of the patient, who is sometimes much relieved by the sitting posture with the trunk tilted forward.

III. To evacuate the effusion and treat the serous membrane by paracentesis of the pericardium and by injection of air into the pericardial cavity (see Part II: *Therapeutic Procedures*).

Purulent exudates may require pericardiotomy and drainage. The applicability of this procedure is still under discussion. It generally consists in making a broad opening into the pericardium after resection of the 5th, 6th and 7th costal cartilages. Recovery is obtained in about one-half of the cases. Duval and Barasty have advocated a median sternal, thoraco-abdominal pericardiotomy as affording a much better view of the affected tissues.

* * *

In chronic pericarditis, and more particularly in the adhesive cardio-pericardic sequelæ, medical treatment is purely palliative, and con-

sists in combatting pain, dyspnea, cardiac insufficiency, etc., by appropriate symptomatic medication.

• **Curative treatment can only be anatomic, i.e., surgical:**

Pericardiolysis (Brauer's operation), or liberation of the chest wall in the heart region by resection of the costal cartilages and ribs overlying the heart without opening the pericardium. This relatively easy and harmless operation yields very variable results, sometimes excellent, frequently disastrous; we are not as yet able to distinguish beforehand the favorable from the unfavorable cases.

Cardiolysis (Delorme's operation), i.e., separation of the adhesions uniting the heart to the pericardium—cardiac “decortication.” In spite of Delorme's many papers on the subject, this difficult, complicated, laborious and dangerous procedure has not yet been generally accepted.

DISEASES OF THE BLOOD-VESSELS.

I. GENERAL CONSIDERATIONS. CARDIOVASCULAR SYNDROMES.—The dissociation of the vascular disorders from those of the heart is in conformity with obvious clinical facts. The practitioner is often called upon to treat a morbid condition the essential feature of which is actually an aortitis or aortic dilatation, a phlebitis or varicose veins.

In truth, however, one cannot possess the general grasp of these conditions necessary for rational and thoroughgoing treatment unless one keeps in mind the intimate anatomic, physiologic and pathologic relationships existing between all portions of the circulatory system and their connections with the other organic systems, the nervous system in particular.

Thus, Cannon has shown that fear or profound anxiety cause a marked stimulation of the sympathetic system and secondarily of the adrenals. The action of epinephrin stimulates, in turn, the sympathetic system. A prolonged excitation of this system, therefore, results. Because of this, circulation is more active, the heart-rate is increased, the pupils are dilated, the eyes prominent, breathing accelerated and general metabolism stimulated. The organism is placed on a war footing. Frequently, especially if the organism is at rest, the amount of glycogen set free by the liver is such that marked glycosuria is produced; let the emotional condition be accompanied, however, by its usual manifestations, *vis.*, physical restlessness, headlong flight or fighting, etc., and this excess of glycogen may be consumed and the complex as a whole appears merely as a defensive reflex.

There is no doubt that even in surgical cases the prognosis is improved if, by reason of his confidence in the outcome, all of the patient's fear and anxiety is removed. In disorders such as exophthalmic goiter, elimination or diminution of fear and excitement is of the greatest importance.

* * *

Again, the question of **vascular tone** is daily assuming greater importance in general medicine, particularly in respect of the diseases of the circulation. It leads to the conception of major neuro-cardio-vascular syndromes which clinical observation is actually bringing to our notice right along. The pathologic physiology of these conditions is still in many respects obscure, and their treatment is therefore unstable and uncertain. The subject is relatively new, and is deserving of brief discussion. Under no other circumstances does the intimate relationship of the nervous system to the circulation show itself so clearly.

The *vegetative nervous system* comprises all the nerve fibers distributed, on the one hand, to the structures containing smooth muscle, such as the blood-vessels and intestine, the glands, etc., and, on the other, to the heart, the terminal muscles of the digestive tract, and the muscles of the reproductive organs. It is distinguished from the *sensory-motor* or *animal nervous system* chiefly by the presence of ganglia in its peripheral distribution.

The vegetative nervous system is divided into the *sympathetic system proper* and the *autonomic* [craniosacral autonomic or parasympathetic] system. The latter receives its fibers from the medulla and the spinal cord, and does not enter into relationship with the sympathetic ganglia. The most important nerve of the autonomic system is the vagus or pneumogastric. The sympathetic and autonomic systems are mutually antagonistic; both supply fibers to each organ. The fibers of the vagus are distributed to the heart, the stomach, the bronchi, the esophagus, the intestine and the pancreas; the fibers of the sacral region supply the bladder, the anus, the reproductive organs, the descending colon and the sigmoid. Does a common center govern these two systems? This we do not know, but these systems can be influenced independently alike by certain drugs and by certain physiologic excitants.

Abnormal excitation—constitutional or accidental—of the autonomic nervous system has been said to result in an actual *functional disease of the autonomic nervous system*. Some recent authors have termed this condition *vagotonia*. Clinically, it recalls to a singular degree the former *neur-*

asthenia of adults, the constitutional debility of children, the lymphatic constitution, status thymicus, *hyposphyrria*, and *neurocirculatory asthenia*.

Abnormal excitation—constitutional or accidental—of the sympathetic results in an actual *neurosis of the sympathetic nervous system* which might by analogy be termed *sympatheticotonia* and which is reproduced in a pronounced, full-blown fashion in *exophthalmic goiter*. It may be manifested in all forms of neurosplanchnic, and more especially neurocirculatory, hyperexcitability.

Let these excitations of the two antagonistic systems recur at a more or less rapid rate as temporary and alternating conditions, and let the opposed phenomena of inhibition be combined with them, and there results a third condition known as *vasomotor ataxia*, manifested in vasomotor fluctuations (vaso-constriction and spasms following more or less quickly upon vasodilatation and relaxation of the smooth muscles). These ischemic and congestive, anemic and hyperemic manifestations are set in motion in the individual constitutionally predisposed to them by a great variety of causes: Toxic (tobacco, alcohol, a hearty meal, etc.), mechanical (exertion, walking), psychic (emotions, overwork) or cosmic (barometric, thermic, magnetic and hygrometric fluctuations). The slightest cause may bring on brain hyperemia with dizziness, a tense feeling in the head, headache, etc.; or, on the other hand, the least fatigue may cause ischemia with increased heart rate, low blood-pressure and faintness. This loss of circulatory balance may be accidental and temporary, *e.g.*, dependent upon an emotional state or passion. But much oftener it is constitutional, especially in the female sex, in which it is met with exceedingly often, especially in the periods of puberty and the menopause. It seems unnecessary to stress further its practical importance.

Many other clinical syndromes in which vasomotor disturbances, painful manifestations and trophic disorders predominate belong in this group, and the part that may be played by the sympathetic should always be thought of in these cases. Local asphyxia of the extremities, or Raynaud's disease, is the type of the sympathetic disorders, and cases are on record (Leriche) in which sympathectomy procured complete relief from the symptoms.

A complete description of the treatment of these various neuro-cardio-vascular syndromes is not feasible herein on account of space limitations. The table entitled "A Plan of Therapeutic Action in Neurotonic Conditions" already presented in the section on *Nervousness* (Part III, p. 985) will, however, give an idea of the complexity of the pathogenesis of many clinical disorders and the close relationship existing between the major physiologic systems, especially the nervous, circulatory and glandular sys-

tems. These systems are of necessity considered separately, however, for didactic reasons—which explains why, *e.g.*, the treatment of the hypophysic syndrome is to be found described under the *circulatory diseases*, while the treatment of Graves's syndrome is described along with the *neuro-glandular dystrophies* (although the sympathetic neurosis undoubtedly predominates) and that of the syndrome of vasomotor ataxia under *nervousness*.

* * *

Thus, as a matter of fact, there is no structure which may not become the seat of vasomotor congestion or ischemia with all the resulting consequences as to function.

Therapeutic efforts directed to the structure which is the seat of these disturbances are ineffective or exert but little action.

On the other hand, everything may be expected from the aggregate of the measures capable of toning up, stimulating or soothing and restoring the balance of the nervous system.

The sedatives (valerian, bromides), analgesics and hypnotics may, when required, be of great service, but should be used only with circumspection, since in the long run they become powerful neuro-circulatory depressants. They easily become psycho-physiologic tyrants, the patients remaining their slaves.

A number of *surgical procedures* involving the sympathetic, some old (cervical sympathectomy in Graves's disease) and some new (periarterial sympathectomy in Raynaud's disease), permit of entertaining the hope that a direct anatomic and physiologic treatment for some of these conditions will be developed.

As a concrete example of the complexity of the indications in these neuro-endocrino-vascular syndromes, an outline of the treatment of the menopausal disturbances is presented herewith.

Medical Treatment of the Disturbances Attending the Menopause.—

From the purely symptomatic standpoint, these disturbances may be divided into four groups:

1. *Plethora, congestion, constipation.*
2. *Nervous disturbances, neuro-circulatory instability.*
3. *Visceral and rheumatoid pains.*
4. *Hemorrhage. Menstrual irregularities.*

While the pathogenesis of each of these groups of symptoms may be different, and consequently involve separate indications, the following measures meet the more general of the indications:

I. Plethora, congestion, constipation:

1. *Reduced diet*, chiefly of vegetables and fruits; low in proteins, in purins and in chlorides, and reduced as to the total amount of food taken.

2. *Depletive treatment*: Wet cupping once a month, and, if necessary, vein punctures or depletive blood-letting.

3. *Purgative treatment*: Aloes or scammony, 0.05 to 0.1 gram ($\frac{3}{4}$ to $1\frac{1}{2}$ grains) twice a week.

4. *Physical exercise*: Abdominal exercises in recumbency, walking, moderately active "feminine" sports.

II. Nervous disturbances:

1. *Tepid hydrotherapy*: Sponge baths, douches and full baths (alkaline or carbon dioxide) twice weekly at 36 to 38° C. (96.8 to 100.4° F.) for twelve to fifteen minutes.

2. *Valerian or its derivatives* (borneol esters) or bromides.

3. *Ovarian extract*.

4. *Avoid*: Tea, coffee, alcohol, spices and other *excitant* ingesta.

III. Visceral or rheumatoid pains:

1. *Opium, belladonna, hyoscyamus, cannabis*.

2. *Sodium salicylate*, 1 to 2 grams (15 to 30 grains) a day.

IV. Hemorrhage:

1. Make certain that it is due neither to a fibroid, a malignant neoplasm, a severe blood disturbance, nor pronounced high blood-pressure.

2. *Fluidextract of hamamelis*, 1 to 3 teaspoonfuls a day.

Fluidextract of hydrastis, 1 to 3 cubic centimeters (16 to 48 minims) a day.

3. When required: *X-ray treatment* of the ovaries.

DISEASES OF THE ARTERIES.

For practical purposes and from the standpoint of treatment, the arterial degenerations are met with in four forms: **Aortitis**, **aortic aneurism**, **localized arteritis**, and **arteriosclerosis**.

AORTITIS.

The treatment of aortitis comprises:

A. CAUSAL TREATMENT: The *prophylactic* and, if feasible, *curative* treatment of the cause:

B. TREATMENT OF THE SYMPTOMS: High blood-pressure, angina, precordial pains, dyspnea, cardiac insufficiency, etc.

A. Causal Treatment.—This presupposes a knowledge of the positive or probable causes of the lesion, and the following data will orient the inquiry into such causes:

Aneurism: (a) *Syphilis*, $\frac{4}{5}$ of the cases; (b) malaria and rheumatism, $\frac{1}{5}$.

Aortitis with insufficiency:

(a) Arterial: Hodgson type: (a) *Syphilis*, $\frac{9}{10}$ of the cases; (b) malaria, $\frac{1}{10}$.

(b) Endocarditic: Corrigan type: *Acute rheumatism*, 95 per cent. of the cases.

Aortitis without insufficiency:

(a) VARIOUS INFECTIONS, acute or chronic, including *syphilis*, $\frac{1}{4}$, and malaria.

(b) DIATHETIC DISORDERS: *Gout*, $\frac{1}{4}$; arthritis deformans (atheroma, arteriosclerosis).

(c) INTOXICATIONS, $\frac{1}{4}$: *Lead poisoning*, *tobacco abuse*, alcoholism, alimentary toxemias.

(d) ANGIOSPASM, $\frac{1}{4}$: Overwork, emotions, profound grief, nervous crethism.

Aortitis with stenosis:

(a) CONGENITAL DYSTROPHY (congenital syphilis, congenital hypoxymia).

(b) Atheroma.

(c) Various infections.

* * *

The following conditions dominate the pathogenesis of aortic diseases:

1. **Syphilis**, acute rheumatism, and malaria.

2. **Gout**, lead poisoning, and alimentary intoxications.

3. **Angiospasm** and nervous crethism.

Accordingly, the *prophylactic* and *curative* treatment will have to be, separately or simultaneously and according to the individual case, either:

Anti-infectious: **Antisymphilic** (or ANTIRHEUMATIC or *antimalarial*).

Antidiathetic and detoxicant: Directed against **gout** (or against *lead poisoning*, or *antitoxemic*), or,

Antispasmodic: **Calmative**, *sedative*, *relaxant*.

Whatever be the existing variety of aortic degeneration, these pathogenetic indications will have to be met, singly or in combination.

Antisyphilitic medication is here best conducted by the combined use of arsenic and mercury, with the iodides as an adjunct. Following are the procedures which I prefer:

MERCURY: Intravenous injections of mercury cyanide; suppositories of mercurial ointment, 0.03 to 0.06 gram ($\frac{1}{2}$ to 1 grain), given in courses of ten days a month, repeated more or less frequently according to the results and tolerance.

ARSENIC: The arsphenamins (neoarsphenamin or galyl), either by intravenous injection or, if this is not feasible on account of material reasons, distances or contraindications, by enema in 100 cubic centimeters of physiologic salt solution. The doses used should be 0.3 to 0.75 gram for neoarsphenamin and 0.15 to 0.45 gram for galyl. The technic is that of Ravaut, and the number of injections, six to ten, at weekly intervals.

I have personally applied this treatment for a long time, with results sometimes extremely satisfactory: Objective retrogression of the lesions in a few cases; considerable subjective sedation without any very appreciable objective change in the majority of cases.

I have never witnessed any untoward results from this treatment and consequently do not share the practically accepted view to the effect that aortitis and myocarditis are almost absolute contraindications to the arsphenamins, which, on the contrary, have yielded excellent results in my experience. To my mind, it is chiefly hepato-renal insufficiency which necessitates extreme caution in the use of this treatment.

In the cases in which a marked contraindication did, indeed, appear to exist on account of a very deep-seated lesion and a yielding myocardium, but in which the treatment nevertheless seemed a necessity because the specific indication appeared absolute, I gave the patient beforehand 10 to 20 drops of adrenalin solution and an injection of camphor in oil, and after the procedure, a hot infusion (tea or *malé*) with the addition of a diffusible stimulant (ammonium acetate). Never, I repeat, did I see any noteworthy untoward effects. And yet, the procedure was carried out sometimes under precarious circumstances, *e.g.*, in the case of a man aged 75 years, suffering from Hodgson's disease of long standing, with relative cardiac insufficiency (dyspnea, edema, albuminuria) which had proven refractory to the most approved treatments for cardiac insufficiency and which had been referred to me by an eminent colleague for this reason. The patient, having been warned of the risk and accepted it, withstood admirably neoarsphenamin intravenously in ascending weekly amounts of 0.15 to 0.45 gram, recovered a very appreciable portion

of his circulatory balance, and was thereby enabled to resume a moderately active life.

The pessimistic opinion in regard to the use of the arsphenamins in aortic and myocardial disease has been dependent, I believe:

1. On the use of arsphenamin (which is, indeed, prejudicial, and for which neoarsphenamin or galyl should be substituted).

2. On the administration of intravenous injections of large volume—several hundred cubic centimeters of fluid,—which are really attended with risk in subjects with high blood-pressure and imminent loss of circulatory balance. Ravaut's method of small injections of 10 to 20 cubic centimeters should be substituted absolutely.

3. On the non-recognition of hepatico-renal insufficiency and nitrogen or chloride retention, frequently present in these patients, and which constitute a contraindication—but only a relative one.

4. On the absence of preventive and after measures: Administration of tonics and stimulants (adrenalin, camphor in oil).

It is feasible, indeed, to test the susceptibility of the patients without much risk by beginning the treatment by the rectal route (enemas), which, moreover, is quite effective.

IODIDES.—If there is no renal contraindication (chloride retention), potassium iodide should be given in solution in average daily amounts of 1 to 3 grams (15 to 45 grains) in courses of ten days monthly.

If chloride retention does exist, iodine albuminates should be given, *e.g.*,

℞ Tincturæ iodi (Codex)	10	c.c.	(f3iiss);
Potassii iodidi	8	grams	(3ij);
Glycerini	6.5	c.c.	(℥c).

M. Sig.: Ten to thirty *drops* in milk with the breakfast.

According to Marcel Pinard, the treatment must be as intensive as circumstances permit, with short periods of interruption not exceeding three weeks. Mercury, arsenic and bismuth should be alternated, with the arsenic sandwiched between the two other drugs, which are similar as to their drawbacks. The bismuth should be administered in intramuscular injections of insoluble salts, twice weekly for six weeks (quinby, muthanol, curalues, etc.). In the intervals of three weeks between the courses of bismuth, arsenic and mercury, potassium iodide should be prescribed. If the iodide is poorly borne, it may be replaced by injections of an iodized oil, such as lipiodol.

Antirheumatic medication, consisting of sodium salicylate in average daily amounts of 3 to 6 grams (45 to 90 grains) (watch the kidneys), is operative only in the earlier stages of the disorder. Yet, it seems useful to prescribe preventive courses of salicyl medication for twelve to fifteen days three or four times a year in subjects with *Corrigan's disease*.

Antimalarial medication consists of:

QUININE: 0.5 to 2 grams ($7\frac{1}{2}$ to 30 grains) in cachets with a weak acid solution for periods of ten or twelve days 3 or 4 times a year.

ARSENIC: Methylarsenates (arrhenal or cacodylates) in daily doses of 0.1 to 0.2 gram ($1\frac{1}{2}$ to 3 grains) for periods of ten or twelve days, alternating with the preceding treatment, three or four times a year; or better, neoarsphenamin or galyl in weekly enemas of 100 cubic centimeters of physiologic saline solution. Dosage: Neoarsphenamin, 0.3 to 0.6 gram; galyl, 0.15 to 0.3 gram; six to eight weekly enemas, once or twice a year.

EMETINE: 0.04 gram ($\frac{2}{3}$ grain) by hypodermic injection.

Antidiathetic and detoxicant treatments consist mainly of:

A **reduction diet** (low in chlorides, proteins, purins and toxics, and reduced as to total amount), if necessary with weekly special days of restriction to water or a fruit or milk diet.

Purgation (preferably sodium sulphate), weekly or fortnightly, or alkaline sulphate cures (Vichy, sodium sulphate) in courses of ten days in each month.

Cautious diuretic treatments (if the cardiorenal condition permits) consisting in the ingestion morning and evening of a suitable dose (100 to 300 cubic centimeters) of a laxiant water, such as Évian, Vittel or Contrexéville.

Administration of uricolytic diuretics of the type of theobromine and lactose in alternate series of ten days in each month.

Interdiction of tobacco and alcohol and withdrawal from occupations involving exposure to lead (plumbers, painters, printers, etc.).

Antispasmodic medication, very important in all cases, since angiospasm is present in all aortic disorders, should be carried out, according to indications, as follows:

Interdiction of stimulants and agents promoting angiospasm: Tea, coffee and, in particular, tobacco.

Sedative drugs: Valerian, bromides, hypnotics (particularly chloral hydrate and carbromal).

Sedative hydrotherapeutic measures: Tepid baths, tepid sponge baths; when indicated, carbon dioxide baths.

Rearrangement of the mode of life so as to exclude the ordinary sources of enervation and vexation (disorder, inaccuracy, overwork, complications, idleness, etc.).

High frequency treatment may, perhaps, have some influence on the angiospastic element in these disorders, but this influence is hardly manifested other than in relation to certain subjective phenomena such as headache and anxiety.

The detoxicant and antispasmodic indications are to be met in all aortic cases, of whatever type.

The anti-infectious indications must obviously be detected and selected by expert clinical investigation.

B. Treatment of the Symptoms.—This is likewise common to all varieties of aortitis, for all are or may be accompanied by high blood-pressure, angina, precordial pain, dyspnea, cardiac asthma, cardiac insufficiency, etc.

This symptomatic treatment will be found discussed in earlier sections on *High Blood-Pressure*, *Angina Pectoris*, etc., and need, therefore, not be given here. I shall merely mention the often remarkable action exerted on precordial pains, with or without radiation along the arms, and perhaps also on the frequency of anginal attacks, of pre-aortic (sternal and parasternal) counterirritation by the weekly application of small blisters ("mouches de Milan"; see Part II: *Blistering*) or even of the "permanent" cautery—an apparently obsolete procedure, but one which is nevertheless at times very useful. Prolonged effluve treatment of the pre-aortic region also sometimes procures material relief.

* * *

It may be of interest here to describe a plan of treatment which positively led to marked improvement in a patient suffering from **aortitis with insufficiency (Hodgson type)** of syphilitic origin who had reached the stage of cardiac insufficiency refractory to the most approved heart- tonic treatment.

FIRST MONTH:

(a) Greatly reduced diet, low in proteins, chlorides and water.

(b) Almost absolute rest in bed or on a couch or armchair.

(c) *First week:*

First three days: Three granules of French crystallized digitalin of 0.0001 gram ($\frac{1}{650}$ grain) each.

Last three days:

℞ Sparteinæ sulphatis 0.03 gram ($\frac{1}{2}$ grain);
Theobrominæ 0.4 gram (6 grains).

Pone in chart. No. i. Da tal. No. x.

Sig.: Three powders daily between meals.

Next three weeks:

First three days of each week: Two granules of French digitalin, as above.

Last three days of each week:

(1) ℞ Sparteinæ sulphatis 0.6 gram (gr. x);
Sodii iodidi 6 grams (3iss);
Syrupi aurantii amari 225 c.c. (f3viiss).

M. Sig.: One dessertspoonful three times a day with the meals.

- (2) \mathcal{R} Unguenti hydrargyri fortioris 0.04 gram ($\frac{3}{8}$ grain);
 Olei theobromatis 3 grams (gr. xlv).

Ft. suppos. No. i. Da tal. No. x.

Sig.: One suppository to be inserted on retiring and retained over night.

At the end of this first month, there was appreciable improvement; dyspnea was less and the edema and albumin had disappeared.

SECOND AND THIRD MONTHS. The treatment was changed thus:

(a) Diet more liberal, but still low in proteins, chlorides and water, with one day of fruit diet in each week.

(b) Comparative rest, with short walks in the apartment and garden.

(c) First three days in each week, two granules of 0.0001 gram of French digitalin. Last three days, the iodide-sparteine combination already given.

(d) First fifteen days in each month, the mercurial suppository previously referred to.

(e) Weekly intravenous injections of ascending doses—0.15 to 0.45 gram—of neoarsphenamin, on the same day as the fruit diet.

Considerable objective and subjective improvement resulted. The manifestations of cardiac insufficiency passed off completely.

ANEURISM OF THE AORTA.

The therapeutic considerations set forth under aortitis likewise apply very completely and precisely to the treatment of aneurism.

Two essential features should, however, be emphasized:

1. *The very great frequency ($\frac{4}{5}$) of the syphilitic origin of aneurism and consequently the cardinal prophylactic importance, and in a measure the curative importance, of specific treatment, the appropriate forms of which have already been referred to under aortitis.*

2. *The "paradoxic" possibility of a more or less lengthy period of survival of cases of aortic aneurism.*

Enormous aneurisms are compatible with life; pathologic specimens and radiograms, while demonstrating the almost inconceivable size which some of these ectasias may attain, show also that, as far as life is concerned, one is justified in being optimistic for a long time—all the more so since death by rupture of the aneurism is, on the whole, exceptional (once out of three deaths), and that more often the subject succumbs after the fashion of an ordinary case of circulatory disease, following progressive aggravation of the associated morbid processes and of the heart failure, asphyxia, combined heart failure and uremia, or cachexia.

Certain adjunct forms of medication may be tried:

Sometimes, **curative treatment** may be attempted, consisting in internal medication having for its purpose the formation of obliterating clots in the aneurismal sac. Lancereaux and Paulesco have recommended for this purpose repeated weekly hypodermic injections

of 100 to 150 cubic centimeters ($3\frac{1}{2}$ to 5 fluidounces) of isotonic 1 per cent. gelatin solution. A few cases of recovery have been reported, but some instances of sudden death due to embolism or tetanus have also occurred. Tetanus can be avoided with certainty by perfect sterilization of the gelatin, but the same cannot be said, unfortunately, of embolism and thrombosis, since it is not possible to set an exact limit to the curative process of coagulation. As a matter of fact, I owe to this method a very gratifying case of recovery, maintained for ten years, although complete thrombosis in the process was escaped only by a narrow margin.

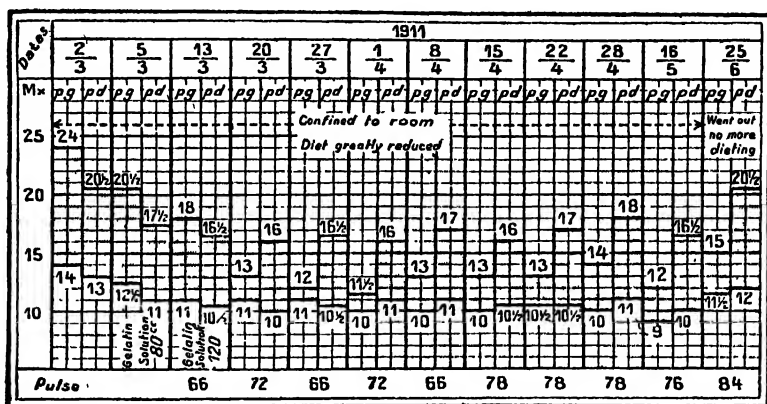


Fig. 280.—F., aged 50 years. Aneurism of the left subclavian, treated by injections of gelatin solution.—Blood-pressures in centimeters of mercury.—pg = left brachial pulse; pd = right brachial pulse.

The case was that of a lady aged fifty years, large and strong, who presented in the left supraclavicular region a swelling pulsating throughout its extent, and over which was audible a marked, rasping bruit. The left arm, plainly swollen throughout its length, was cyanotic. The diagnosis of aneurism of the subclavian with disturbed venous circulation in the left arm was obvious. Such a diagnosis had, indeed, already been made by Delbecque and by Guinard. The left pulse, probably because of general dilatation of the arteries on that side, was stronger than that on the right and this impression was confirmed by sphygmomanometric examination, which showed, as illustrated in Fig. 245, a considerable discrepancy between the two sides: $240/140$ on the left and $205/130$ on the right. Antisyphilitic treatment had previously been followed without result. I recommended absolute rest in bed and a considerable reduction of diet, which caused the blood-pressure manifestly to recede, but without influencing materially either the size of the swelling or the discrepancies of pressure on the two sides: $205/125$ on the left and $175/110$ on the right. Accordingly, on March 5th I administered an initial intramuscular injection of 80 cubic centimeters of gelatin solution, which slightly reduced the size of the swelling and also reduced the pressure discrepancies; $180/110$ on the left and $165/105$ on the right. A

second injection of 120 cubic centimeters was given on March 13th; it resulted in numbness of the entire left arm, with paresthesia, malaise and an imperceptible pulse; the swelling was reduced and no pulsations could now be felt in it. The blood-pressure determinations gave an objective demonstration of these changes in the form of an inversion of the formulas on the two sides; the pulse on the right side ($100/100$) was now manifestly larger than that on the left ($130/110$). These changes were maintained thereafter, as shown in the illustration; the swelling was markedly reduced and no longer pulsated; the bruit completely disappeared and the arm diminished in size; the evidences of venous compression, including the cyanosis, passed off; while paler and colder on the first few days on account of the insufficient circulation, the arm gradually returned to its normal size and appearance. These results had been practically maintained three months later. The circulatory condition in this patient showed no very material change thereafter. She succumbed to cerebral hemorrhage in 1920.

Plainly, the gelatin solution had brought about closure of the aneurismal sac with secondary contraction and reduced caliber of the left subclavian, leading to a species of experimental endarteritis obliterans.

* * *

With the same object in view, *vis.*, obliteration of the aneurismal sac by induced coagulation, organization and secondary contraction of the clot, there have been recommended **electropuncture**, **galvanopuncture**, and, in particular, **acupuncture**, *i.e.*, the introduction into the aneurism of foreign bodies of various sorts (soft wire, silkworm gut, watch-springs, etc.). The first two procedures have given only very uncertain and very incomplete results, and the least that can be said of the last procedure is that it seems more dangerous than the aneurism itself. The many pathologic specimens I had occasion to examine at the London Congress in 1913 seemed to confirm the disastrous impression conveyed by the older statistics of Verneuil showing 34 cases of acupuncture in aneurism with 30 deaths, either immediately or in the months succeeding the operation. [Nevertheless, a number of favorable cases of wiring and electrolysis have been reported in this country.—Tr.]

The various palliative ligations proposed (carotid, or carotid and subclavian) have yielded only mediocre and temporary results.

On the occasion of the report by Rénon of a suggestive case with survival of $6\frac{1}{2}$ years and appreciable improvement (reduction of pain and dyspnea) in a fusiform aneurism of the arch of the aorta after wrapping of the aneurism with a band of fibrous tissue from the tensor fasciæ femoris and section of the sympathetic nerve fibers to the aortic arch (operation performed by Tuffier in 1914), a discussion

arose at the Académie de médecine on the surgical treatment of aneurisms.

While appreciative of the successful result obtained by Tuffier, I quite agree with the opinions expressed by Fiessinger and Vaquez on that occasion. Medical treatment (especially antisyphilitic treatment) affords to the practitioner measures much less uncertain and dangerous than the surgical methods which, for the present at least, should be regarded as available only for quite exceptional cases.

Early diagnosis of aortitis, systematic and energetic specific treatment and, if need be, gelatin injections—these remain at present the most certain agencies in the treatment of aneurism.

Indeed, careful reading of the case referred to appears to show that the protective action of the parietal reinforcement or "cerclage" was doubtful, and probably it was mainly the sympathectomy necessarily carried out by Tuffier in the course of the dissection of the aorta which led to cessation, as in the cases of angina reported by Jonnesco, of the painful manifestations and a good part of the functional phenomena. In this direction, the case is certainly a suggestive one, and one likely to be fruitful.

* * *

On the whole, *aside from the antisyphilitic treatment*, the therapeutic balance sheet in relation to aortic aneurism is practically negative so far. Only the injections of gelatin in saline solution appear to me to be really capable of favorable action, though attended with some risk.

Apart from this, absolute or comparative rest and a reduced diet are indicated.

It is well to repeat, however—to mitigate whatever there may be of disappointment in this therapeutic summarization—that even very large aortic aneurisms are sometimes compatible with prolonged life.

Further, the patients succumb much oftener to a complication or to the gradual progress of their cardiorenal or general failure than to actual rupture of the aneurism. **The concurrent syndromes should therefore be carefully treated:** Partial or total cardiac insufficiency, or cardiac insufficiency in combination with uremia, should be treated in conformity with the indications already referred to.

Finally, the treatment should also be symptomatic and calculated to prevent complications insofar as is possible. Spasm of the glottis may necessitate tracheotomy; uremia, venesection; pressure on the esophagus, gastrostomy; hemoptysis, hemostatic medication, etc.

Following is a plan of treatment which is not theoretic, but effective, having actually proven itself valuable and caused very marked improvement in the case of aneurism in which it was applied:

Case of aortic dilatation in which the vessel was of the size of the two fists, with dyspnea, cough, swollen face and anginoid symptoms.

FIRST MONTH:

- (a) Almost absolute rest, in bed or on an armchair or couch.
- (b) Milk and fruit diet with a few biscuits (1½ liters of milk).
- (c) Eight wet cups over the kidneys on the first and the fifteenth day.
- (d) *First twelve days:*

- (1) R Tincturæ iodi (Codex) 10 c.c. (f3iiss);
 Potassii iodidi 8 grams (3ij);
 Glycerini 6.5 c.c. (℥c).

M. Sig.: Sixteen to thirty *drops* in milk every morning.

- (2) R Unguenti hydrargyri fortioris 0.05 gram (gr. ¾);
 Olei theobromatis 4 grams (3j).

Ft. suppos. No. i. Da tal. No. xii.

Sig.: One to be inserted on retiring.

Next twelve days:

Every four days, an enema of 0.1, 0.15 up to 0.25 gram of neoarsphenamin in 100 cubic centimeters of physiologic saline solution, to be retained.

Last seven days:

No treatment.

Marked improvement, especially after the neoarsphenamin; weight reduction by 4 kilograms (8.8 pounds), reduction of blood-pressure and disappearance of the pains in the arms.

SECOND AND THIRD MONTHS:

- (a) Comparative rest in the house and garden; short outings.
- (b) Same diet with 2 liters of milk and one day of fruit diet weekly.
- (c) Six wet cups once a month.
- (d) *First twelve days:*

Same iodine, iodide and mercury medication as above.

Next twelve days:

Every four days, enemas of increasing doses—0.3, 0.3, 0.45, 0.45 grain (first month), 0.3, 0.45, 0.6, 0.75 gram (second month)—of neoarsphenamin dissolved in 100 cubic centimeters of physiologic salt solution.

Last seven days:

No treatment.

Marked improvement, manifested especially in disappearance of dyspnea, of the facial swelling, of the anginoid symptoms, of the retrosternal and arm pains, of the cough, etc.; considerable reduction of blood-pressure, especially the diastolic, without appreciable change in the aortic enlargement.

ARTERITIS.

This condition is generally a syphilitic or malarial arteritis manifested pathologically in a process of ordinary endarteritis. Tobacco

abuse, alcoholism and arthritis deformans may apparently be incriminated in a few cases.

As a rule, the condition occurs in one of the following forms:

1. Form limited to the extremities, often mistaken for chilblains or simulating Raynaud's disease.

Medical treatment (mercury, arsenic, iodides, quinine) is generally sufficient.

2. Relatively sluggish form, progressing toward dry gangrene of the senile type. If, in spite of general specific or anti-malarial treatment (mercury, quinine, arsenic), the condition leads to the formation of small patches of gangrene, the aim should be to "embalm" the necrotic area and resort to excision only for adjustment of the tissue surface in a manner which spares the tissues.

3. Form with massive and extensive gangrene. Medical treatment is ineffective and expectation attended with risk. In the presence of dry gangrene, temporization is indicated in order to reduce the sacrifice of tissue to a minimum.

4. In the presence of rapidly progressive moist gangrene, amputation affords the only chance—and an uncertain one—of saving life. The amputation should be as simple as possible, without primary suture; secondary union should then be promoted by all possible means. Treatment with mercury, arsenic or quinine, or with a combination of these agents, is always to be recommended.

Arterial permeability should be thoroughly taken into account in deciding on the operation. It should be investigated in the affected limb by means of the oscillating sphygmomanometer (Pachon's oscilometer). The operation should be done only in normal tissue well supplied with blood at a point where the oscillations are distinct and pronounced; this is the essential pre-requisite for healing of the stump. Intervention should be undertaken very early if a good result is to be obtained.

Leriche and Policard, who have made a systematic study of *localized arterial occlusions*, have been led, from the surgical standpoint, to conclusions that may be summarized thus:

When an artery is occluded over a limited distance, the portion of it distal to the occlusion adapts itself, according to the anatomic and physiologic possibilities, to the new circulatory conditions.

But from the fact that an artery is contracted or thickened, it does not follow that the vessel is tending toward complete obliteration: Arteries in process of functional adaptation do not become occluded as long as the circulatory conditions are not again modified.

Consequently, in the presence of a localized occlusion, it is theoretically always possible to restore arterial continuity, and the observers mentioned believe that there would be good reason for testing the practical value of these deductions by resecting, in the case of an arterial occlusion which is not well borne, the occluded portion of the vessel and restoring arterial continuity by circular suture or grafting. Leriche and Policard have worked out the indications of the proposed operation, showing how the clinical consequences of occlusion of an artery should now be understood—aside, of course, from the most severe disturbances due to ischemia, such as local or diffuse gangrene, complete muscular fibrosis, etc.

One group of disturbances resulting from insufficiency of blood-supply to a few muscle-groups after ligation is that exemplified by intermittent claudication, etc. The operative procedure proposed may be attempted in such cases, sympathectomy not being worthy of trial.

The second group of disturbances following high arterial occlusion are those known collectively as Volkmann's syndromes (separate contracture of one muscle, ischemic paralysis). In cases of Raynaud's disease with dry gangrene, however, the operation proposed would be powerless, as the lesion is then a burned-out, cicatricial one.

The third group of disturbances observed after arterial occlusion comprises the modifications of vasomotor innervation of the limb as a whole. These attacks of painful ischemia point to a disturbed state or disorder of the peri-arterial sympathetic, the source of which is to be looked for at the site of the occlusion. The ideal treatment would be to resect the affected portion and restore the continuity of the artery in normal tissue. Under such circumstances a complete cure would probably be obtained.

ARTERIOSCLEROSIS.

As a sequel or end-result of, or non-specific degeneration secondary to, plethora, angiospasm, infections (syphilis), intoxications (exogenous and endogenous, tobacco and lead, food toxics, etc.) and senile involution, arteriosclerosis constitutes, on the whole, an actual infirmity. Its progress can be arrested and its consequences guarded against, but it cannot be completely cured.

The considerations presented in respect of aortitis are also wholly applicable here. The **preventive, prophylactic treatment** is that of plethora, of angiospasm, and of infections and intoxications (see *Aortitis*).

The **palliative and essentially pathophysiologic treatment** is that of cardiorenal insufficiency—the predominating feature of the sclerotic miopragia.

Once more the following therapeutic outline may be recalled:

DIET PERMANENTLY DECREASED AS TO ITS TOTAL AMOUNT, LOW IN PROTEINS, CHLORIDES, TOXICS AND CALCIUM, WITH RESTRICTION OF FLUIDS.

To these cases especially should be applied the famous precept of the school of Salerno: *Modicus cibi, medicus sibi*.

Articles permitted:

Lean or milk soups.
Butcher's meats: Beef, mutton; exceptionally veal.
Fresh water fish: Trout, pike, carp, gudgeon, etc., excluding salmon and eels.
Sea fish: Sole, turbot, whiting.
Fowl.
Rabbit.
Milk.—Cheese.
Legumins: Beans, lentils.
Green vegetables: Green peas, string beans, lettuce, cooked chicory.
Egg, 1.
Potatoes, carrots, rice, pastes (macaroni, etc.), sweet potatoes, turnips, salsify.
Curdled milk, 120 to 150 c.c.

At one meal only,
in restricted amounts,
80 to 100 grams.

Raw fruits: Oranges, grapes, strawberries, raspberries, currants, cherries, plums, pears, apples.

Cooked fruits: Jams, marmalades, jellies, compotes.

Dry biscuits, small tarts.

Puddings, rice cakes.

Beverages: Water, orangeade, lemonade. Aromatic infusions. Cider; greatly diluted white wine.

Bread: Toast or soft crust (100 grams at most).

Articles forbidden (or at least to be avoided):

Salt and salty foods.

Fats, sauces, ragoûts and fat dishes.

Mushrooms, sorrel, spinach, truffles.

Sweetbreads, game, shell-fish, pork products, preserved meats, fermented cheese.

Chocolate, cocoa, champagne.

Spices, condiments, hors-d'œuvre.

Alcohol.

Culinary remarks:

Meat and fowl.—Broiled or roasted, without sauce.

Fish.—Boiled, with fresh butter and lemon juice added just before serving.

Eggs.—Preferably boiled or poached, or the yolks alone.

Vegetables.—Boiled, with fresh butter and lemon juice added before serving.

Salads.—Cooked, or raw and very tender; seasoned preferably with a little salt and lemon juice.

Fruits.—Cooked with very little sugar, or raw and very ripe.

Thick soup.—Purée of vegetables, strained or with milk.

Amounts (in 24 hours):

Meats, fowl or fish.—80 to 100 grams, exclusively at the noon meal.

Eggs.—One only.

Milk.—200 c.c.

Bread.—At most 100 grams.

Vegetables.—In moderation.

Salt.—At most 2 grams.

Beverages.—One glassful at meals; not over 800 c.c. a day.

Soups.—One-half plateful.

* * *

The patient's mode of life should be so adjusted as to exclude insofar as is possible emotions and sources of vexation and "enervation" which tend to raise the blood-pressure, and likewise, of course, fatigue and overwork.

It should, however, include regular daily outings and sufficient walking to keep the heart and lungs in condition.

The substitutional functions of the skin should be maintained by daily dry, alcohol (Cologne water) or aromatic rubs.

* * *

Many **physiotherapeutic procedures** may be recommended as adjuncts: Abdominal exercises in recumbency, massage and Swedish gymnastics; tepid sedative baths, sponges and showers; carbon dioxide baths and light treatments. High frequency, which has certainly been excessively advertised, deserves neither such undue attention nor complete discredit. I have used it for a long time without ever observing any effect either on the arteriosclerosis *per se* or on one of the most objective manifestations—high blood-pressure. It does seem, however, to exert a favorable effect on certain unpleasant symptoms, especially headaches, dizziness and asthenia.

* * *

The treatment of arteriosclerosis has been the subject of an extremely extensive, in large part fanciful, or materially interested literature; the opportunity for expatiation is a tempting one in the case of a disorder alike so common, so incurable and so obscure as to its pathogenesis.

Among all the suggestions made, there is one which appears worthy of attention, *viz.*, **decalcification**, a procedure to be recommended at least in some forms of atheroma. This indication is to be met:

1. By ordering a **diet low in calcium** (such as that above formulated). It should be noted here that the strict milk and vegetable diet often prescribed is a diet high in calcium, and that, as a matter of fact, atheroma is very frequent in herbivorous animals. It does not appear to be suitable as a fundamental diet for arteriosclerotics because it requires the ingestion of an excessive quantity of food, an exaggerated intake of fluids, and the taking of an amount of calcium which is really dangerous for an old person. The moderate, mixed diet outlined above has always given better results in my experience.

2. By **decalcifying (acid) medication**.

Generally, I carry this out by *phosphoric medication* for ten-day periods. At the same time I am in the habit of ordering *one or two days a week of greatly restricted diet* (1 liter of milk only, or a stringent fruit diet with a few crackers) combined with rest at home or in bed in serious cases.

It should be repeated, however, that all dietary régimes, of whatever sort, are subject to continuous revision and must be carried out only under close supervision, and particularly, under the guidance of the body weight, blood-pressure, and urinary output. Any unduly rapid reduction of weight and blood-pressure accompanied by weakness and oliguria requires an increase in the diet, both quantitatively and qualitatively.

It seems useful to combine with the dietetic treatment:

1. **Blood-letting**, of varying amount and frequency (fortnightly, monthly or every three months) according to the degree of plethora or of high blood-pressure (wet cupping over the lumbar regions or liver, vein punctures, leeching behind the mastoid, or even actual venesection).

2. **Systematic depletive and detoxicant intestinal derivations** by means of aloes, scammony or sodium sulphate, two or three times a week according to indications.

3. **Alternating courses of medication**, heart-tonic, diuretic, sedative, vasodilator, decalcifying, etc. For example:

(a) *Ten days in each month:*

Crystallized digitalin, 1:1000 solution, 3 to 5 *drops* a day. Or:

℞ Tincturæ iodi (Codex)	10	c.c.	(℥iiss);
Potassii iodidi	8	grams	(3ij);
Glycerini	6.5	c.c.	(℥c).

M. Sig.: Eleven to twenty drops in milk every morning.

(b) *Next ten days:*

A valerian preparation in suitable doses morning and evening between meals.

Or:

℞ Sodii arsenatis	0.05 gram (gr. $\frac{1}{4}$);
Sodii bromidi	8 grams (5ij);
Syrupi aurantii amari	225 c.c. (f3viiss).

M. Sig.: One dessertspoonful three times a day with the meals.

(c) *Last ten days:*

Theobromine, 0.5 gram ($7\frac{1}{2}$ grains) in the morning on awakening and again on retiring, with a half-glassful of Vittel water.

Or: Sodium silicate in a daily dosage of 1 to 2 grams (15 to 30 grains) in a 2 per cent. solution; one or two tablespoonfuls three times a day with the meals.

Or: Tablets of silicic acid each containing 0.1 gram ($1\frac{1}{2}$ grains); six to ten tablets a day.

Or:

℞ Acidi phosphorici diluti	36 c.c. (f5ix);
Sodii biphosphatis	20 grams (5v);
Aquæ destillatæ	170 c.c. (f3vj).

M. Sig.: Two teaspoonfuls at noon, one teaspoonful in the evening, after meals, in a little sweetened water.

This treatment is to be continued for two, three or four months, or repeated every two or three months, according to indications.

Along the same lines, one might recommend:

Lactic preparations (curdled milk, kephyr, lactic ferments); citric preparations (citric acid, lemon juice, lemonade), or cider.

* * *

ARTERIOSCLEROSIS WITH GOOD COMPENSATION, predominantly cardiorenal, with markedly high blood-pressure in a former syphilitic, alcoholic and plethoric.

The **therapeutic indications** are here purely palliative, *restitutio ad integrum*, alike of the tissues and functions, being impossible. The indications are several:

1. **SPECIFIC:** Mercury should be resorted to, either by intramuscular injection or—preferably, in my opinion—in suppositories. Iodide in small doses (0.5 gram— $7\frac{1}{2}$ grains—a day), or better, an extemporaneously prepared iodine albuminate, often yields favorable effects.

2. **DEPLETIVE:** To antagonize the plethora: Blood-letting, vein punctures and wet cupping, on the one hand; purgation, on the other.

3. **ANTISPASMODIC:** Angiospasm is always present in these cases.

4. DETOXICANT: A reduced, hypotonic diet and, when required, blood-letting, purgation, diuretics and heart remedies.

Practical Application.—Following is a typical plan of treatment:

I. WET CUPPING over the kidneys and liver every month or two.

II. REDUCED DIET, particularly low in chlorides; no salt, no dressings; low in proteins (100 grams of meat, fowl or fish at one meal only); low in purins (exclusion of game, shell-fish, sweetbreads, etc.); chiefly a vegetable and fruit diet. Absolute abstention from alcohol.

Two days in each week: Milk diet, at most $1\frac{1}{2}$ to 2 liters in four divided amounts at regular intervals; or better, a fruit diet, comprising cooked or raw and thoroughly ripe fruits, dry biscuits and infusions.

III. *First ten days in each month:*

℞ Unguenti hydrargyri fortioris 0.04 gram (gr. $\frac{1}{25}$);
 Olei theobromatis 3 grams (gr. xlv).
 Ft. suppos. No. i. Da tal. No. x.
 Sig.: Insert one on retiring.

Painstaking care of the mouth and teeth.

Stop the suppositories in the event of diarrhea.

Next ten days:

℞ Tincturæ iodi (Codex) 10 c.c. (f3iiss);
 Potassii iodidi 8 grams (3ij);
 Glycerini 6.5 c.c. (℥c).
 M. Sig.: Eleven to twenty drops in milk at breakfast.

Last ten days:

Theobromine, 0.5 gram ($7\frac{1}{2}$ grains) morning and evening with a cup of cornsilk infusion to which have been added 2 teaspoonfuls of lactose.

IV. *Two or three times a week:* On retiring, one or two pills of aloes, 0.1 gram ($1\frac{1}{2}$ grains) each.

V. SEDATIVE, ANTISPASMODIC GENERAL HYGIENE:

1. A stay in the country, if possible.
2. Patient's time to be occupied systematically and quietly.
3. No tobacco; no alcohol.
4. If required: Valerian or bromides.

* * *

Crenotherapy in arteriosclerosis may be summarized as follows:

Nervous, angiospastic cases should be sent to the sedative resorts.

Uricemic subjects with cardiorenal reserve power not yet exhausted and reacting well to diuretic treatments, to the diuretic resorts.

Cardiac cases with cardiorenal reserve power materially reduced, to the heart resorts.

* * *

The **complications** of arteriosclerosis, *viz.*, cardiac insufficiency, cardio-renal insufficiency, angina, cardiac asthma, epistaxis, cerebral hemorrhage, asthenia, etc., should be treated along the usual lines appertaining to these symptoms and conditions (*q.v.*).

DISEASES OF THE VEINS.

PHLEBITIS.

The general treatment of phlebitis is based on the following four principles:

1. **Some individuals**, in particular the hyposphyxics, with sluggish circulation and a marked tendency to venous stasis, are especially **predisposed to phlebitis**, so that the prophylaxis of phlebitis includes the treatment of hyposphyxia (see Part III: *Hyposphyxia*, under *Low Blood-Pressure*).

The same is true of the treatment of varicose veins, to be considered below.

2. **Phlebitis is the result:**

(a) Of an **infection**:

Acute: Medical: Typhoid fever, influenza, pneumonia, erysipelas, etc.
Surgical: Traumatic or post-operative.

Obstetrical: Puerperal.

Chronic: Syphilis, tuberculosis.

(b) Or of a local **diathetic** involvement:

Typically: Gouty phlebitis.

(c) Or the end-result of **cachexia**:

Type condition: The terminal phlegmasia of tuberculous and tumor cases.

The foregoing etiologic syllabus shows that **pathogenetic treatment** may and should be practised in certain cases, both for prophylactic and for curative purposes.

Phlebitis of syphilitic origin will be prevented or cured by the arsenicals and mercury, with iodides as an adjunct.

Gouty phlebitis will be prevented and sometimes cured by treatment directed to the gout.

Puerperal phlebitis will most often be obviated by faultless antiseptics.

The risk of infectious phlebitis will be reduced by judicious and attentive treatment of acute infections, and sometimes the specific

(vaccines), non-specific (colloids) or antiseptic (mercurial) treatment of the infection will favor its resolution.

In short, the etiologic factor should not be lost sight of in the treatment of phlebitis.

3. Established phlebitis, of whatever cause, requires the use of a series of **purely palliative measures** having for their purpose mainly:

(a) To spare the patient suffering.

(b) To prevent the really serious, sometimes fatal, complication of phlebitis: Embolism.

Regarding the first of these indications, Castaigne expresses himself thus:

(a) "The measures intended to mitigate the pain experienced in the affected limb should be employed only on the first few days following the onset of the phlebitis; after this time the pain generally passes off of its own accord. To combat the pain, some authors have recommended the rubbing of soothing liniments containing belladonna or chloroform over the affected limb, or counterirritant rubs with, *e.g.*, ammonium chloride. These agents alike might not always be harmless and would introduce the risk of mobilizing the phlebotic clot. It is much better to resort to a simple cotton dressing and to use as sedatives the opiates, antipyrin or acetylsalicylic acid given by the mouth and, if necessary, injection of morphine, the efficacy of which is constant."

(b) As for the measures to be taken to **prevent embolism**, it must be admitted that we possess but one measure, purely empiric and very uncomfortable for the patient, *viz.*, immobilization in a simple or double gutter-splint. Especially should it be borne in mind that on account of the usual femorotibial situation of the phlebitis—which may extend as high as the iliac—it is not only the leg and thigh, but also the body, which must be immobilized, and the sitting posture strictly forbidden. Bonnet's splint is therefore the ideal method of immobilization whenever it can be resorted to.

(For the details as to its application, see Part II: *Therapeutic Procedures*.)

The **curative measures**, of whatever nature, prove of little service in this stage. Theoretically, colloidal and mercurial medication would seem to be indicated, but as a matter of fact the benefit to be obtained from these agents is uncertain.

4. The immobilization of the affected limb should be continued for a sufficient length of time, but not for too long a time. Excessive immobilization leads to an inordinate degree of muscular atrophy,

stiffness of the joints and functional impairment—which to some extent are inevitable.

It is therefore advisable to practice mobilization of the joints and muscular reëducation as soon as one is certain that the inflammation of the vein has completely subsided. The older authors specified an arbitrary period of forty days in this connection—a serviceable cloak for ignorance and laziness; there is no doubt that this period may be either too short or too long in different cases. It is necessary in each case to look carefully for the presumptive evidences of recovery from the inflammation. Castaigne, with his usual conciseness and sagacity, describes these evidences as follows: "The indications which lead to this conviction are progressive diminution, followed by disappearance, of the edema and pain, with prolonged apyrexia. When, for twenty days, the local reactions have regularly and progressively decreased, and provided during this time the temperature has not risen again beyond the normal, massage may be practised. During the first week, only effleurage of the affected leg and slight mobilization of the joints of the toes and foot should be carried out. In the next week, massage of the muscular masses should be added to these procedures, and then the large joints should be mobilized. At this juncture the patient may be allowed out of bed, and he should then return gradually to his normal habits."

(See also the section on *Kinesitherapy*, Part II.)

CRENOTHERAPY FOR THE RESIDUAL LESIONS OF PHLEBITIS AND VARICOSE VEINS.

Carron de la Carrière (*Presse méd.*, Sept. 11, 1919) has given an excellent account of this subject, from which the following discussion is largely taken:

"When the acute stage of phlebitis has long since ended and the inflammation has wholly subsided, the chief symptoms, *edema, pain and impaired function of the limb*, are found not to have disappeared with the inflammatory process that gave rise to them; although this process is extinguished, they persist in all patients without distinction in a more or less pronounced form and for a varying period of time and constitute what have been termed the *sequela of phlebitis*" (Hannequin). In this second stage of the disease, they are due to three causes, *viz.*, occlusion of the vessel, the remains of the inflammation in the vein and the prolonged immobilization of the limb.

Therapeutic Indications.—1. To accelerate *reabsorption of the serous fluid* mechanically extravasated by reason of the vascular block. To facilitate the development of a *collateral venous circulation*.

2. To bring about disappearance of the *exudates or material lesions* which have been left by the vein inflammation. To relieve *pain*.

3. To overcome *joint stiffness* at the knee, foot and hip. To build up *atrophied muscles*, and to mobilize the joints and restore the ability to walk.

4. To strengthen the *general condition*, weakened by the prolonged stay in bed and in the room.

Convalescence, always prolonged and burdensome, is often broken into by threatened recurrences; thermal treatments constitute the most active means of shortening it, as they meet all the indications present.*

What phlebitic cases are suitable for hydromineral treatment?—All cases of phlebitis due to *infections*: (a) *Medical*: In the course of acute diseases, such as typhoid fever, influenza, pneumonia, erysipelas, gonorrhea, etc.; inflamed varicose veins. (b) *Surgical*: Traumatic and post-operative. (c) *Obstetrical*: Puerperal. (d) Phlebitis of *diathetic* origin: Rheumatism, gout, syphilis. The only cases to be excluded are those of phlebitis due to *cachectic conditions*, such as cancer and tuberculosis.

When may the convalescent phlebitic journey to a thermal resort?—As soon as he can be moved; “as soon as all chance of an easily produced embolism seems to have disappeared” (Censier); about the fortieth to the fiftieth day after subsidence of the fever.

“In a general way, it may be regarded as a fact that after six weeks the clot is permanently fixed and will no longer become detached” (Göttinger). Particular caution is necessary in cases of rheumatic, gouty or varicose origin, in which embolism is more especially to be apprehended.

“About the thirtieth to thirty-fifth day after subsidence of the fever the patient is in full convalescence and may begin to get up and walk; from the fortieth to the fiftieth day he can travel, and may be brought to Bagnoles. This is the most favorable time to begin the thermal cure” (Hannequin).

“In a general way, the thermal cure may be undertaken without risk about forty days after the last rise of temperature, when the veins have ceased to be tender and the edema is manifestly diminishing” (Petit).

It is not necessary to wait until the patient is able to walk when, having been free of fever for a long time, he is kept in bed beyond the usual period because of persistent pain or edema or a threatened relapse at every attempt to get up. Each year, phlebitic patients of this type are brought to Bagnoles on stretchers, and are bathed, with excellent results, before they have taken their first steps since the illness.

The thermal treatment is all the more effectual when it is applied as early as possible, before the inflammatory exudate has had time to become organized. Such early treatment at the resort is obtainable only in cases in which the phlebitis has occurred at the time of year when the thermal resort is open. More usually, several months have elapsed since the beginning of convalescence before the resort is visited.

There are many other resorts that may be beneficial in these cases, but Bagnoles-de-l'Orne indisputably holds the first place: All are agreed concerning its value. Each year cured patients are further enhancing the reputation of the place; no specialized resort can be more firmly established than this one. *Phlebitis* = *Bagnoles-de-l'Orne* is a therapeutic equation which is altogether warranted and is known throughout the French medical profession and lay public.

*[The French resort, Bagnoles-de-l'Orne, about which the subsequent discussion mainly revolves, is, of course, not likely to be availed of by many American sufferers from this disorder. The apparently well-founded belief existing in the French medical profession in the outstanding efficacy of treatment at this resort makes the description given of some interest as illustrating the possibilities in this type of treatment.—Tr.]

The treatment given there consists of *baths*, the temperature of which, always below the body temperature, ranges from 33 to 36° C. (91.4 to 96.8° F.), and the duration of which, at first limited to a few minutes, may gradually be increased to fifty or sixty minutes. "A simple bath cure, at moderate temperatures, combined with the use of water by the mouth" (Censier). There is sometimes added to it, always with great circumspection, the "*douche sous-marine*" [water-jet directed against the body under water], with light massage of the muscles, "effleurage" of the veins and mobilization of the joints.

The results are excellent. *Pari passu* with the absorption of the edema and disappearance of joint stiffness, the pain stops, strength returns and there is improvement of the general condition.

In a case of phlebitis convalescing normally with a spontaneous tendency toward recovery, the baths further promote this tendency by slightly stimulating the normal reactive processes of the organism (Hannequin); recovery is complete and rapid.

In an obstinate, refractory case which, in spite of all treatment—immobilization, baths, massage, etc.—is the despair of the physicians and patient, the Bagnoles baths bring relief in a measure exceeding the most optimistic predictions. Having reached the resort an invalid, the patient leaves it almost a normal person. The transformation of the phlebitic case is so complete that it may appear inconceivable or marvelous, and yet is an actual fact.

Hypothetic interpretations of the mode of action of the treatment at this resort may vary, but clinical observation remains immutable and impressive. A water apparently ordinary and indifferent nevertheless exerts a selective, intense action on the residua of the venous inflammation. The evidences of this striking activity are unquestionable.

The Bagnoles cure should be repeated for two or three consecutive years, even though recovery has been obtained the first year; even in the most favorable cases, when the phlebitis is of medium intensity, the veins often remain markedly frail and sensitive for a long time after recovery; a few days spent at the resort constitute a definite prophylactic against the risks of the succeeding winter.

"When the phlebitis has been severe, and when the patient does not reach the resort until a long time after the onset of the disease, recovery is less rapid and relapses are more to be feared. In the first year, two cures should be gone through at two or three months' interval, *e.g.*, in June and September, and the patient should return to the resort several years in succession. Really refractory cases are extremely few; even when the phlebitis dates back several years, recovery is certain, but a larger number of cures are required to obtain it" (Hannequin).

VARICOSE VEINS.

The majority of the vein disturbances dependent upon a varicose condition fall into three groups:

1. *Plethora and atony of the veins* the result of fatigue or the ingestion of exaggerated amounts of fluid.

2. *Insufficiency of the valves.*

3. *Endocrin disturbances*, especially pronounced in obese and hypophyxic subjects.

For each of these venous syndromes there is available, in some degree, an appropriate plan of treatment.

1. Plethora and atony of the veins require:

- (a) Massage and myotherapy.
- (b) Diet and restriction of fluids.
- (c) Prescription of the usual venous vaso-constrictors (*hamamelis*, *hydrastis*, *ergotin*).

2. Insufficiency of the valves necessitates:

- (a) Passive reduction of the varicosities by the wearing of bandages or stockings.
- (b) On occasion, surgical treatment.

3. Endocrin insufficiency calls for the treatment of hypophyxia (see Part III: *Low Blood-Pressure*).

- (a) Suprarenal and pituitary extracts.
- (b) Thyroid and ovarian extracts, especially in the obese.

Again, one may resort to:

- (a) Sodium citrate and the iodides, acting as liquefacients and reducers of blood viscosity.
- (b) Strychnine and hypodermic injections of oxygen gas (very effective for neuro-circulatory stimulation; perhaps the only true stimulant of this type).

- (c) Physical agencies, especially gymnastics, including respiratory exercises, and myotherapy in the horizontal position.

The above constitutes the most generally applicable and practical plan for the treatment—often disappointing—of varicose veins.

Further details concerning the most essential features of this treatment will now be given.

Medicinal Treatment of Varicose Veins.—Much of the data required in this connection has already been presented under *Hypophyxia* (see Part III: *Low Blood-Pressure*). The dosage of the drugs to be given in alternation will alone be dealt with here.

(a) Venous vaso-constrictors:

1. Fluidextract of *hamamelis*.—Small doses of this preparation are altogether useless. Two or three teaspoonfuls a day should be given if an appreciable effect is to be obtained.

2. Fluidextract of *hydrastis*.—Thirty to fifty drops should be given three or four times a day in sweetened water—not in an alcoholic mixture.

3. *Ergotin*.—0.1 to 0.5 gram ($1\frac{1}{2}$ to $7\frac{1}{2}$ grains) a day.

- R Extracti hydrastis (N. F.),
 Extracti ergotæ aquosi (N. F.) āā 0.05 gram (gr. $\frac{3}{4}$).
 Ft. pil. No. i. Da tal. No. lx.
 M. Sig.: Two to eight pills a day. (CASTAIGNE.)

(b) Neuro-circulatory tonics and stimulants:

1. *Strychnine*: Ascending dosage of 0.003 to 0.01 gram ($\frac{1}{20}$ to $\frac{1}{6}$ grain) *per diem*. Three to ten granules of 0.001 gram ($\frac{1}{65}$ grain) each a day in three doses with the meals. Or better: Hypodermic injection in ascending amounts, according to tolerance.

2. Hypodermic injection of 1 to 2 liters of *oxygen gas* twice a week.

(c) Endocrin preparations:

1. Adrenalin solution, 1:1000, 30 to 60 *drops* a day in three doses, between meals. Or better: Capsules of whole adrenal extract, 0.3 gram (5 grains) each, three a day.

2. Whole pituitary extract, capsules of 0.2 gram (3 grains) each, three a day.

3. Thyroid gland, capsules of 0.025 to 0.1 gram ($\frac{3}{8}$ to $1\frac{1}{2}$ grains) each, two or three a day, according to tolerance and indications.

4. Whole ovarian extract, capsules of 0.2 gram (3 grains) each, three a day.

(d) Liquefacient agents:

1. Sodium citrate, 2 to 5 grams (30 to 75 grains) a day in a solution or mixture.

Or better:

Liberal use of lemons as condiment and beverage (lemonade).

2. Sodium iodide, 1 to 2 grams (15 to 30 grains) a day in a solution or mixture.

The foregoing drugs should be given in alternation or combination in accordance with the indications in the individual case.

Diet in Varicose Veins.—Strictly speaking, there is no dietetic treatment for varicose veins; yet, there is obviously an indication to combat:

1. **Plethora** by restriction of water (a total of 1 liter of fluid at the most) and reduction of the aggregate diet under the guidance of the scales and urinary output.

2. **Interstitial edema**, which varicose subjects are very prone to show, by restriction of salt.

3. **The undue accumulation of carbon dioxide in the blood**, by restriction of sugars and other carbohydrates.

4. **Blood coagulability**, by interdiction of gelatinous foods (calves' head and feet, jellies, etc.).

In brief:

Reduction of the total amount of food.

Fluids to be reduced to 1 liter at most.

To be avoided: Salt and salted foods.

Sugar and sweet foods.

Fats, sauces, ragoûts and fat articles.

Gelatinous foods.

Crenotherapy in Varicose Veins.—See *Phlebitis*.

Physical Exercise in Varicose Veins. (See also Part II: *Kinesiotherapy*.)—The muscles constitute an actual peripheral venous heart, the contractions of which cause the blood to travel from the periphery toward the heart.

The mere act of transferring the weight of the body alternately from one leg to the other is a powerful factor in accelerating the flow of blood in the veins of the lower extremity. This fact is sufficient to prove that walking is a most valuable assisting factor in the circulation of the limb.

But, as Poulain has rightly pointed out, there is a source of difficulty in this connection: While walking is useful, it can hardly be kept up any length of time in individuals who soon become fatigued. It then becomes necessary to resort to adjunct measures capable of assisting in the regeneration of the muscles, *viz.*, *rubs*, *exercises in recumbency*, *electricity* and *massage*.

The last-named measure must be carried out very carefully. Light effleurage will drive into the larger channels the dark blood that has passed out into the small superficial channels. As for pétrissage (kneading) of the muscles, it can be carried out only with great care to avoid the varicose veins.

To build up the muscles certain sports may be substituted for the massage, but it should be kept in mind that while some such activities are indicated, others are to be forbidden.

Walking is the type of the allowable forms of exercise, but must be done at a definite gait and kept up for a considerable time. The best rate is that of 120 steps to the minute, continued for a total of at least two hours, but divided into many fractions.

Bicycle riding is very useful for cases of varicose veins provided the saddle is raised sufficiently high to permit of complete extension of the lower limb and the pedal is sufficiently broad to insure a support for the plantar surface of the foot as complete and as even as is afforded in walking.

Horseback riding may be beneficial, especially with the horse at a trot, supplying such a support for the sole of the foot as will promote muscular contractions. The full gallop and walk are to be avoided.

Swimming would be an ideal sport for these cases, but arthritic subjects with varicose veins often have many reasons for avoiding cold water.

As for *rowing*, it may be practised with the sliding seat, permitting of alternate flexion and extension of the lower limb.

On the other hand, all activities which more or less closely reproduce a prolonged standing posture and which, in addition, require continuous exertion must be interdicted; outstanding among these are *fencing* and *mountain climbing*. *Gymnastic exercises*, *tennis*, *billiards*, *dancing* and *football* likewise have little to recommend them.

Mechanical Support in Varicose Veins.—In the case of varicose veins not yet of long standing, elastic and still retaining part of their tone, and in the absence of insufficiency of the valves, it is best to avoid passive support of the veins and resort especially to active reducing procedures, chiefly myotherapy.

In the case of varicose veins of long standing, which have partly or wholly lost their tonicity, and in the presence of valvular insufficiency, it is best to support and passively reduce the varicose veins by the wearing of elastic bandages or stockings: Bandages of flannel or rubber carefully applied, without folds, in the milder cases, and elastic stockings made to measure in the intermediate and severe cases. With this treatment it is necessary to insist on: 1. Daily careful cleansing of the varicose area with soap and warm water. 2. Frequent cleansing of the supporting device.

Treatment of the Complications of Varicose Veins.

1. **External rupture** should be tamponed, or if need be, treated by ligation or excision.

2. **Internal rupture** is treated by rest in extension, compression, and later, massage.

3. **Phlebitis** is treated by:

Absolute rest on a posterior splint.

Application of resolvent (?) moist dressings of alcohol, arnica, ammonium chloride, etc.

Later on, mobilization.

If required, excision.

4. **Ulcers** call for:

Rest in bed.

Aseptic dressings.

Hot air treatments and the effluve.

One might try local use of a plaster containing 18 per cent. of metallic mercury and 3 per cent. of turpentine, or the following ointment:

℞ Balsami Peruviani	20 grams (5v);
Adipis lane hydrosi	25 grams (3vj);
Petrolati	5 grams (gr. lxxv).—M.

Surgical Treatment of Varicose Veins.—Delbet and Mocquot have summarized this as follows:

Indications.—Saphenofemoral anastomosis and excision operations are suitable only in varicose conditions of the internal saphenous. It is best not to operate in varicose veins following deep phlebitis.

Theoretically, the results are best when operation is resorted to early, but as a matter of fact, operation should generally be reserved for:

1. Steadily extending varicose veins.
2. Varicose veins entailing disturbances of function (pain, paresthesia, cramps).
3. Varicose veins complicated by rupture, ulcer or phlebitis. In the last-named event, "one should, obviously, not operate when there is acute infection, redness of the skin about the ulcers, lymphangitis and glandular swellings; it is advisable to wait until careful dressings have brought about disappearance of all these manifestations."

Choice of Operation.—*Saphenofemoral anastomosis* is mainly indicated:

1. "In cases in which the varicose veins, with or without accompanying pain, are still, as it were, in the first stage of their course, when the skin and cellular tissue are healthy and the veins soft and with their muscular coat still active."
2. In cases in which the varicose condition is very extensive and diffuse, in which many tributaries of the saphenous are diseased and in which excision would necessitate unduly extensive dissection.
3. Where ulcers exist, "provided, however, these ulcers are not in a condition of acute infection, accompanied with lymphangitis, marked edema, and especially, recent phlebitis."
4. When the patient is young and strong.

There must also be present certain anatomic conditions, of which the surgeon is the sole judge.

Excision, conversely, is mainly indicated:

1. In recent or former phlebitis and in the residua of phlebitis.
2. In ruptured varicose veins.
3. Where the muscular coat of the veins is too much atrophied and the veins have lost their contractility.
4. Where the dilatation is limited to the internal saphenous trunk and one or two collateral branches.

Treatment by Intravenous Injections.—Sicard has advocated for the cure of varicose veins intravenous injections of a 10 per cent. solution of sodium carbonate (*Soc. méd. des hôp.*, Nov. 12, 1920). The question thus

brought up is rather important, the results obtained rather encouraging, while the technic involves a number of details:

Technic.—Chemically pure sodium carbonate is used in a 10 per cent. solution, sterilized and kept in special hard glass, or prepared before use.

The successive steps in the procedure are these:

1. Puncture of the vein.
2. Injection of a few cubic centimeters of physiologic salt solution.
3. Injection of the soda solution.

1. The puncture of the vein is done in the usual way, with a short-bevelled platinum needle connected with a 5 c.c. syringe into which have previously been drawn up 2 c.c. of salt solution.

A vertical position of the limb is to be preferred, as it promotes turgescence of the varicose vessels and facilitates the puncture.

2. The injection of salt solution is a control procedure intended to demonstrate that the needle is actually within the vein. If it is not, this preliminary injection will cause the appearance of edema in the perivascular cellular tissue, and a new start is necessary. If the needle is in the proper position, a small stream of blood will enter the syringe, the injection of salt solution will cause no edema, and the sodium carbonate solution can then be injected.

3. The needle being held in the proper place, a 20 c.c. syringe containing 10 c.c. of 10 per cent. sodium carbonate solution is connected with it. The injection is made slowly, in the course of about one or two minutes.

During the injection the patient feels pain, sometimes sharp, which lasts but a few seconds, or at most one minute.

These injections must be repeated "daily or every two or three days, according to the type of varicose condition."

Solutions other than that of sodium carbonate may be employed. For example:

℞ Sodii salicylatis 1 gram (gr. xv);
Aque destillatæ 5 c.c. (℥lxxx).

This solution is to be put up in sterile form in an ampule. From 2 to 5 cubic centimeters (32 to 80 minims) are used in one injection and up to 10 cubic centimeters at a sitting.

℞ Sodii salicylatis 2 grams (gr. xxx);
Aque destillatæ 5 c.c. (℥lxxx).

From 2 to 3 cubic centimeters (32 to 48 minims) per injection and per sitting.

These are non-caustic solutions, free of risk.

Procaine, 0.01 gram ($\frac{1}{6}$ grain) per cubic centimeter, may be added; 0.05 gram ($\frac{3}{4}$ grain) can be injected at one sitting. This eliminates

the painful reaction resulting from muscular contraction after the irritant injection.

℞ Hydrargyri iodidi rubri,
Sodii iodidi,
Sodii chloridiāā 0.01 gram (gr. $\frac{1}{6}$);
Aquæ destillatæ 1 c.c. (℥xvj).

One to 2 cubic centimeters (16 to 32 minims) of this solution are injected at a sitting.

℞ Quininae hydrochloridi 0.4 gram (gr. vj);
Æthylis carbamatis 0.2 gram (gr. iij);
Aquæ destillatæ 3 c.c. (℥xlviij).

This is to be put up in an ampule. Dose: 3 to 6 cubic centimeters (48 to 96 minims) at a sitting.

Results.—"Five to twenty injections are, as a rule, required to cure varicose veins of medium grade.

"The procedure is not painful, and hundreds of occlusions of sections of veins following the use of luargol have been observed without embolic manifestations having ever resulted. No such case has been observed among over forty patients with varicose veins who underwent the soda treatment. The treatment is ambulatory and in no way interferes with the usual life of the individual.

"Aside from the cosmetic result, the pain arising from the varicose veins disappears after the earlier injections. Healing of the ulcers, while taking a longer time, proceeds steadily. Recovery in the first few cases treated has already been maintained over two years" (Sicard and Paraf, *Presse méd.*, No. 84, 1920).

Sodium carbonate is an alkaline caustic which is "harmless to the organism" when sufficiently diluted. It is free of thrombogenic properties, since, among all the patients treated, none of the many injections given was followed by embolism. It should not be forgotten, however, that while sodium carbonate, in the way in which it is used in the treatment of varicose veins, "is free of all toxicity, it is nevertheless a strong escharotic." It is, as a matter of fact, a substance having a great affinity for water and capable of absorbing it at the expense of the molecular water of the body tissues.

"In the circulating blood, sodium carbonate finds enough water to obviate its dehydrating action exerting itself to a harmful degree. This is the reason why it does not burn the vessel wall" (Bonnet).

In the cellular tissues, on the other hand, it quickly causes "dislocation of the living molecule and death of the tissue cells."

The production of areas of necrosis which take a long time to heal may thus result from faulty technic.

Hence the need of adopting all precautions to the effect that the injection *shall be made wholly into the vein*.

Sicard mentions three main indications for this treatment:

1. A varicose condition of large subcutaneous veins which have not affected the skin but form cylindric, more or less separate, swellings.

2. Painful varicose veins causing heaviness in walking, neuralgic pains and loss of function (these conditions are relieved on the day after the operation).

3. Varicose ulcers, when not of too long standing nor too extensive. They heal steadily, after fibrosis of the superficial varicosities has occurred.

As contraindications there should be remembered the varicose veins of pregnancy, which improve after delivery; superficial telangiectatic varicosities the result of dilatation of the capillaries of the dermis; cases complicated with elephantiasic edema; those in which the veins have seemingly burst at many points, and the presence of an endo- or periphlebitis. This last contraindication may be only temporary.

HEMORRHOIDS.

The **prophylactic treatment** of hemorrhoids consists in treating preventively the commoner predisposing causes: Constipation, plethora, gout, hyposphyxia, hepatic congestion, etc. (*q.v.*). Nothing more will be said of it here, except to stress the importance of this, strictly speaking, *etiologic* treatment.

The **palliative and curative treatment** of established hemorrhoids may and should bring into play:

1. Local measures.
2. Internal medication.
3. Various physiotherapeutic procedures.
4. When required, surgical intervention.

Local Hygiene and Other Measures.—The local hygienic care of hemorrhoids may be summed up in the single word *cleanliness*, to be obtained by *external washing* with soap and even by a sitz-bath, if possible, after each defecation. This may be supplemented, if need be, by *internal rectal lavage*.

Many medicinal combinations of belladonna and cocaine are in common use. To these agents may be added hamamelis, hydrastis, ergotin, etc. For example:

- (1) The French official ointment of poplar-buds (onguent populéum):

℞ Populi gemmarum (N. F.) (recent.)	....	8 grams (3ij);
Papaveris somniferi foliorum (recent.),		
Belladonnæ foliorum (recent.),		
Hyoscyami foliorum (recent.),		
Solani nigri foliorum (recent.)	.....āā	5 grams (gr. lxxv);
Adipis	.....	40 grams (3x).

M. Sig.: For external use.

Stovaine, 1 gram (15 grains), may be added to the above formula, especially if there is itching.

(2) ℞ Extracti belladonnæ,		
Cocainæ hydrochloridi	.....āā	0.02 gram (gr. $\frac{1}{40}$);
Extracti hamamelidis	.....	0.2 gram (gr. ii);
Olei theobromatis	.....	3 grams (gr. xlv).

Ft. suppos. No. i. Da tal. No. x.

Sig.: Insert one on retiring.

(3) ℞ Epinephrinæ hydrochloridi	.....	0.001 gram (gr. $\frac{1}{100}$);
Extracti krameriæ (N. F.)	.....	2 grams (3ss);
Olei theobromatis	.....	3 grams (gr. xlv).

Ft. suppos. No. i. Da tal. No. x.

Sig.: Insert one on retiring.

(4) ℞ Epinephrinæ hydrochloridi	.....	0.0005 gram (gr. $\frac{1}{200}$);
Stovainæ	.....	0.01 gram (gr. $\frac{1}{6}$);
Extracti hamamelidis	.....	0.3 gram (gr. v);
Olei theobromatis	.....	3 grams (gr. xlv).

Ft. suppos. No. i. Da tal. No. x.

Sig.: Insert one on retiring.

Internal Medication.—This is an uncertain procedure for the treatment of hemorrhoids, in which the agents chiefly employed are *hamamelis*, *hydrastis* and *ergot*. The ordinary dosage of these drugs has already been referred to under *Varicose Veins* (see above).

Physical Measures.—A really active and recommendable agency is the *high frequency current*. It is easily applied with the aid of a rectal electrode. There is no doubt that in many favorable cases, when the hemorrhoidal condition is neither too severe nor too inveterate, there are obtained after a few sittings: Reduction and subsidence of the hemorrhoids, relief from pain and cessation of the bleeding. I have personally witnessed many very remarkable cures under this treatment. The results in a few of the cases may be described as a radical cure by fibrous transformation. At all events, this method, quite harmless and at times exceedingly effective, appears to me worthy of recommendation in all cases in which a surgical operation seems indicated. It will often render the latter superfluous.

Surgical Treatment.—This is required in prolapsed piles or piles causing severe and refractory pain or hemorrhage. Delbet divides the surgical procedures into three groups:

1. **Dilatation**, carried out abruptly with the fingers or Trélat's anal speculum.

It has sometimes given excellent results, especially in relieving pain and spasm. As is well known, this is the treatment of choice in anal fissure.

This apparently mild operation is, however, extremely painful and requires deep anesthesia. Many cases of fatal collapse have been reported. I personally observed one such case in a young woman. Paradoxically, I have seen it admirably borne by a patient who was destined to succumb a few months later in an anginal attack.

To avoid such accidents, Quénu has proposed that one use merely local anesthesia by means of wicks moistened with stovaine and cocaine, passed into the rectum, and by injections of the same solution around the anus and into the sphincter muscle.

Personally, I definitely prefer *high frequency* (effluve) treatment.

2. **Chemical procedures**, consisting either of applications of various agents (zinc chloride, silver nitrate, acids) or interstitial injections of creosote, iodoform in ether, or phenol in glycerin. These are mediocre procedures, much inferior to high frequency.

3. **Destructive methods**.—Destruction with the *thermocautery* may be of service for external and circumscribed hemorrhoids. *This is the method of choice for the practitioner* (see Part II: *Therapeutic Procedures*).

Surgeons have devised three methods of radical excision:

WHITEHEAD: Removal of the hemorrhoids *en masse* over a clamp and careful suture of the remaining edges.

QUÉNU: Painsstaking dissection of the rectal mucosa, with submucous removal of the cellulovascular hemorrhoidal tissue. Suture of the mucous membrane after the manner of a graft.

DELBET: Separate excision and suture of each hemorrhoid.

The **treatment of complications** is wholly symptomatic.

Hemorrhage is combated with astringent and hemostatic applications (tannic acid, ergot, saturated solution of antipyrin, hydrogen peroxide) and, if necessary, by cauterization and high frequency.

Inflammation and infection, by antiseptic emollient preparations, wet dressings, belladonna applications, etc.

Prolapse, by taxis and reduction after applications of adrenalin and cocaine.

Sloughing, by antiseptic "embalming" of the tissues, followed by spontaneous elimination, or by surgical intervention (always uncertain in its results).

PSYCHOTHERAPY OF CIRCULATORY DISEASES.

Careful psycho-analysis is a pre-requisite to all psychic treatment.

In no field is such analysis more necessary than in heart disorders and more especially in the cardiac neuroses, particularly the anxiety neuroses. Let it not be thought that all has been said that can be said when the disturbance has been ascribed to overwork in conjunction with an inherited predisposition, and that all has been done that can be done when rest and a few neuro-cardiac sedatives have been prescribed. The heart is the most sensitive of all the viscera—the most subject to obscure suffering as a result of the complicated disturbances and continuous conflicts inherent in life. The attrition and cares of family, of life, the anxieties dependent upon occupational obstacles, thwarted passions, ungratified wishes, love, envy, hate, jealousy, etc., are at the bottom of most of the morbid cardiovascular reactions.

In the last analysis, emotion, of whatever kind, makes up the psychoneurotic element of various disorders, and this emotion is very often dependent upon poor adaptation of the individual to the physical, mental and moral conditions of his life, or upon lack of family or social harmony, to which there necessarily corresponds a loss of psychophysiologic equilibrium.

* * *

The important part played by psychotherapy has been too much emphasized at various points in this work to necessitate returning to it at length here (see, in particular, *Angina Pectoris* and *Anxiety Neurosis*). Let it be said merely that psychic treatment is a two-edged sword capable of soothing and improving true heart cases, of curing pseudo heart cases, but also of building up out of the whole cloth the most serious and incurable cardiac neuroses. It may restore confidence, faith, joy in life, and cardiovascular relaxation in a true heart case with angiospasm and high blood-pressure; but it may literally throw into despair, terrify or, according to the case, debilitate or expose to angiospasm a predisposed neurotic subject wholly free of organic cardiovascular disease.

Optimism is therefore very often needful and a powerful therapeutic factor in heart treatment. Even so, it should not be sufficiently blind as to lead to the overlooking of established lesions and the omission of the precautions and guarded statements thus rendered

necessary. In this connection there is one observation which is of considerable practical importance: It is generally relatively easy to secure, by appropriate treatment, a rapid and striking retrocession of the symptoms dependent upon cardiac or cardiorenal insufficiency. Few events are more gripping and encouraging to the patient and even to the attendant than the disappearance in a few days of edema, oliguria and dyspnea in a well-treated case of heart weakness. But while victory is brilliant and easily won, the process of consolidating the gains is much less so. Consolidation and exploitation of the victory usually encounters as an obstacle the invincible optimism of the patient, who acts in accordance with the Italian proverb: "*Passato il pericolo, bruciato il santo,*" and, the danger being past, and considering himself cured, casts the physician, drugs and diets to the winds, with the inevitable result of suffering increasingly serious relapses, progressively more difficult to relieve. A dyspeptic, even after recovery, remains somewhat uneasy and careful, but an improved heart case is, as a rule (with the exception of neurotics), unduly optimistic and imprudent. It is therefore advisable, when the heart patient has escaped from the danger of the acute attack, to warn him that his condition is an unstable one and can be kept balanced only by very careful general hygiene. In short, the nature of his disorder should be clearly explained to him, together with the hopes he may entertain if he consents to take proper care of himself and the inevitable risks of an hygienically irregular mode of life.

Diseases of the Respiratory Tract.

I

RHINITIS, PHARYNGITIS AND LARYNGITIS.

BY G. LAURENS, M.D.

GENERAL TREATMENT OF NASAL DISORDERS.

From the therapeutic standpoint it is needful for the practitioner, not so much to know how to cauterize the turbinates or remove polyps, as to be thoroughly familiar with the indications and technic of the commoner therapeutic procedures, such as cleansing of the nasal cavities, the application of certain remedial agents, etc.

I. CLEANSING THE NASAL CAVITIES.—This is effected by means of warmed, aseptic (boiled) fluids. There are two procedures:

1. The *nasal bath*, which consists in introducing a small amount of fluid into the nose without pressure and keeping it there for a time.
2. *Lavage of the nose* or the nasal douche.

A. The Nasal Bath.—**Indications.**—This measure should be ordered with the object of improving the condition of the nasal mucosa in certain mild, catarrhal forms of congestive rhinitis, cold in the head, etc. The bathing with warm fluid often exerts an excellent *decongestive* effect on the mucous membrane.

It is carried out with a nasal pipette, *morning and evening*, and alternately through the two nostrils. A cold fluid should never be used, but always fluid at a temperature ranging from 37 to 42° C. (98.6 to 107.6° F.).

Alkaline, detergent solutions are employed, *e.g.*, sodium borate, six teaspoonfuls, or sodium bicarbonate, four teaspoonfuls, in a liter (quart) of water.

The fluid used in making the solution should always be physiologic saline solution, made by dissolving 7.5 grams (2 drams) of salt in 1 liter (quart) of water.

Antiseptics are never to be recommended, as they irritate the epithelium of the mucosa. In free nasal suppuration and septic coryza, however, boric hydrogen peroxide, one teaspoonful in a glass of saline solution, may be prescribed.

B. Nasal Lavage.—"I wash my nose out with boric acid solution" is a stereotyped expression which few physicians have not heard.

Whether the patient's nose be obstructed or patent, dry or moist, he must have his daily nasal douche: This is his nasal panacea. Furthermore, he considers it a hygienic, antiseptic procedure, and in order to be clean, he washes out his nose every morning along with his face. Sometimes he sniffs up water from the washbowl in the hollow of his hand; at other times, it is the irrigating device which

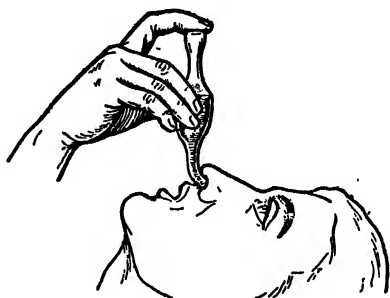


Fig. 281.—Technic of the nasal bath.

The pipette having been filled with the prescribed solution and the finger-tip placed over its outer opening, the other end is inserted in the nose. The head is now thrown back and the outflow of the liquid regulated with the finger-tip.

The patient breathing quietly through the mouth, the fluid will remain in the nose, without descending into the throat, on account of the reflex contraction of the soft palate. After staying in this position for half a minute, the patient bends his head forward to let the fluid run out.

This procedure is repeated until the contents of the glassful of solution has been used up.

lends its services—unless it be, instead, the urethral syringe. Sometimes it is a physician who has counselled this procedure; more often, some friend, who has been douching his nose for a long time.

It is necessary for the practitioner, before he recommends nasal lavage, to know: 1. Its indications. 2. Its contraindications. 3. Its technic.

1. When is nasal lavage to be recommended?

"Wash uncleanly noses." This is a simple, though homely, expression which should be borne in mind. It is absurd to recommend cleansing of a cavity which provides for its own asepsis. Nature

has, indeed, provided the nasal vestibule with a cutaneous covering layer bearing vibrissæ which arrest all dust, smoke and septic particulate matter. If these foreign substances were nevertheless to pass into the interior of the nose, the mucus secreted by the nasal mucosa would dissolve them and drive them out to the exterior. The physiologic dispositions of the nose are therefore sufficient for its defence; there is no need of resorting to artificial procedures.

These elementary facts should be explained to the patient; it should be pointed out to him that while he washes over his eyelids every day, he has never even thought of dropping the least drop of water into his eyes. The same should be true of the nose; the normal nasal mucosa dislikes the contact of water, even if it is aseptic, boiled or antiseptic. Pure water acts detrimentally on the epithelium of the mucosa; antiseptic solutions destroy it and induce disturbances of the sense of smell—anosmia.

The nose, then, should be washed only when it is unclean and in some cases in which: 1. A **foreign body** is present. 2. The nasal cavities are filled with crusts (**ozena**) or **purulent mucous material**. In the first case, the irrigation will exert a curative action; the fluid should be introduced through the nostril of the normal side, so that the jet of fluid will be reflected out again through the obstructed nasal cavity and expel the foreign body from behind forwards. In *ozena* the lavage has for its purpose mechanically to rid the nose of the malodorous crusts and mucus coating its walls and to eliminate temporarily the characteristic odor of *ozena*.

2. When is it to be avoided?

Nasal lavage should always be avoided in **acute nasal inflammations**, in order to obviate infection of the paranasal organs, *viz.*, the ears and accessory sinuses, and in all cases of **nasal obstruction**, as from hypertrophic rhinitis or polyps, under which circumstances the irrigation would be mechanically hindered.

3. How shall the practitioner give instructions for nasal lavage?

To explain the procedure to the patient orally is a good plan, as is also a practical demonstration of it in his presence; but to write down for him all the details of the technic is the best plan of all, as it will fix it in his mind.

Accordingly, the following written instructions may be given:

1. *Irrigate the nose morning and evening.*

2. *For this purpose, use a receptacle of enamelled ware suspended about 50 centimeters (20 inches) above the head. Connect an olive-shaped nozzle of glass or hard rubber with the end of the rubber tubing, or even*

simply a glass vaginal nozzle with but one opening and of about the size of the thumb.

3. *Fill the receptacle with 1 liter (quart) of warmed water to which has been added 1½ teaspoonfuls of salt (physiologic salt solution).*

The following *alkaline* solution may be used:

Sodium borate 100 grams (3iij).
One tablespoonful to the liter (quart) of water.

or a *sulphurous* solution:

Sodium monosulphide 10 grams (3iiss);
Boiled water 200 c.c. (f3viss).
One teaspoonful to the liter (quart) of water.

4. *Sit at a table, with the head over a bowl; then insert the end of the nozzle into one nostril so as to close it completely. The nozzle should be directed horizontally backward in the same direction as the mouth—not vertically from below upward, in the direction of the ear.*

The nozzle is held in the right hand, while the left regulates the flow by pressure on the rubber tube. The water will then enter through one nostril and flow out again through the nasal passage of the opposite side.

5. *Throughout the lavage, breathe quietly with the mouth open, without swallowing and without talking. Pressure is made occasionally on the tube so as to stop the flow and rest for a few moments.*

6. *When the irrigation is finished, the water remaining in the nose should be expelled by blowing alternately through the two nostrils, the unused nostril being closed with the finger.*

7. *During a cold in the head or a sore throat no irrigation should be carried out.*

8. *If, in the course of the procedure, pain in the ear appears, due to penetration of the water therein, the irrigation should be stopped and the saliva swallowed four or five times in succession with the mouth closed and the nostrils pinched together with the fingers.*

After the writing of these instructions is finished, they may be further gone over orally with the patient.

The lavage should be carried out morning and evening *regularly*; otherwise the benefit produced may be lost. This point is of especial importance in *ozena*. The odor set-free in the daytime hinders all social relationships, the patient leaving traces behind him, as it were, wherever he goes; as for the odor at night. . . .

The solution used should be *copious* in amount (1 or 2 liters, if necessary), in order to obtain a more pronounced mechanical effect, and *warmed*, as cold water is poorly borne by the nasal mucosa.

By way of *drug* content, alkaline solutions should be prescribed, possessing the advantage of dissolving mucus well and of not injuring the mucosa; especially should any antiseptic be avoided which might destroy the epithelium.

The fact should be emphasized that the nozzle must be *inserted horizontally*, and not vertically, since in the latter event the stream would expend its force in the olfactory region, causing severe headache and creating a horror of the procedure on the part of the patient.

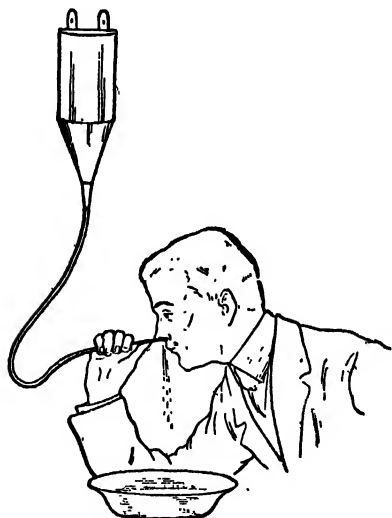


Fig. 282.—Nasal lavage.

Correct position of the nozzle, which should be directed horizontally from before backward. In this manner, no headache results and the fluid runs out of the opposite nostril.

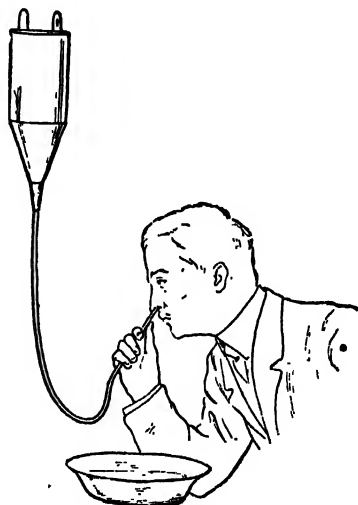


Fig. 283.—Nasal lavage.

Incorrect position of the nozzle, directed from below upward. The stream of fluid, impinging on the ethmoid region, induces severe headache.

When the douche is finished, the patient should not blow his nose while making pressure on both nostrils at once, lest the water be forced into the ear and infect it, but should blow through the two nostrils in alternation, pressing on the opposite nostril with the finger.

All irrigation should be *stopped* during the course of an acute coryza, to avoid infecting the ears. I have personally seen a number of cases of otitis, followed in several instances by mastoiditis, after nasal lavage. The patient should by all means be spared the distress of having water enter his nose and come out again by way of the mastoid process in the form of pus.

II. USE OF CERTAIN DRUGS.—In daily practice it is not necessary to be familiar with the application of topical remedies in the nose, careful anesthesia, or cauterization, as the technic is somewhat difficult, belongs in the domain of the rhinologists, and answers only certain very special indications; the same applies to the insufflation of powders, which may be irritant and ultimately induce anosmia.

The practitioner should, however, prescribe: (a) *Sprays of fluids.* (b) *Inhalations.* (c) The use of *ointments.*



Fig. 284.—Apparatus for spraying oil into the nose.

This is a glass apparatus with removable nozzle, easily cleaned.

Aqueous solutions, such as 1 per cent. cocaine in physiologic salt solution, may be used for mitigating nasal obstruction in severe coryza. Oily solutions, such as 1 per cent. eucalyptol or camphor in liquid petrolatum, are also used. The spraying should be carried out two or three times a day.

A. Sprays.—*Indications.*—For treatment of the nasal mucous membrane (secretions, catarrh, congestion, last stages of coryza, chronic coryza, acute obstruction) by spreading a mist or film of fluid over the whole surface of the nasal mucosa.

Technic.—See Fig. 284.

B. Inhalations.—*Indications.*—To decongest the mucous membrane with warm, medicated inhalations which will penetrate into all re-

cesses of the nose. Especially in acute coryza and in accessory sinusitis. Steam inhalations afford the only active treatment of beginning maxillary or frontal sinusitis.

Technic.—See Fig. 285.

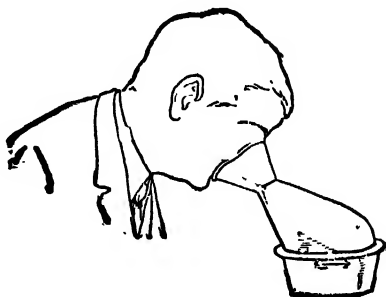


Fig. 285.—Apparatus for and technic of inhalations.

The apparatus consists of a pan or bowl over which is placed a cardboard funnel, or better, a special inhaler. The receptacle is filled with very hot water and a teaspoonful of a suitable medicinal solution added, *e.g.*:

℞ Tincturæ benzoini,
Tincturæ eucalyptiāā 60 c.c. (f3ij);
Olei pini sylvestris 2 c.c. (f3ss).—M.

Or:

℞ Alcoholis 120 c.c. (f3iv);
Mentholis 4 grams (5j).—S.

The patient should be instructed to inhale the fumes for five minutes through the nose, with the mouth closed, and to avoid exposure to cold air for the succeeding fifteen minutes.

Three to six inhalations a day may be ordered, according to the type of case.

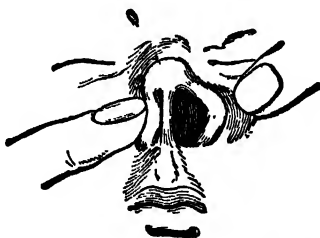


Fig. 286.—Introduction of an ointment in the nose. A 1 per cent. preparation of camphor, menthol or eucalyptol in pure petrolatum, with 20 per cent. of boric acid added, may be prescribed. A piece of ointment about the size of a pea is placed at the opening of one nostril with a small spoon. The other nostril is then closed, the cheek and ala on the side of the ointment drawn outward with the finger, and air inhaled strongly through this nostril. The same procedure is then gone through with the other nostril. The ointment is best prescribed in a metallic tube.

C. Ointments.—*Advantages.*—Ointments serve by exerting a detergent effect on the mucous membrane and by loosening crusts and

mucous accumulations. Their action on the mucosa persists for a considerable time.

Technic.—See Fig. 286.

ACUTE CORYZA.

A few therapeutic recommendations may be in order in respect of this very common and recurring disorder, the curative, specific treatment of which remains to be found. The symptomatology is too well known to warrant any description.

A. WHAT THE PRACTITIONER SHOULD KEEP IN MIND.—This includes, in the first place, the passage of coryza into the *chronic* form; accordingly, the observer should not limit his assistance to a sneezing person to such time-honored expressions as “God bless you” or, as the Romans said, “Salve.”

Next, there are the various *complications*, more or less serious, involving neighboring structures, *e.g.*, frontal and maxillary sinusitis, otitis, and laryngitis—the latter particularly unfortunate in persons whose occupation calls for the use of the voice.

Lastly, in children, repeated coryza is often merely an expression of acute, recurring inflammation of *adenoid vegetations*.

B. TREATMENT DURING CORYZA.—An *abortive treatment* for coryza is not yet known. Each patient has some procedure which succeeds in his case, and the physician should take care not to modify it. One patient inhales menthol; another, ammonia; another, cocaine or menthol; another takes aconite; another goes to bed and induces sweating. . . . These treatments should not be interfered with; but if the patient seeks medical advice on account of the annoyance of repeated colds, the nasal speculum should be used, and may reveal a polyp, diseased turbinate, septal ridge or other lesion accounting for the recurrent attacks.

The *palliative treatment* proves somewhat more satisfactory, though purely symptomatic.

For the nasal **obstruction** one may apply in the nose with cotton, or better, use as a spray, a few drops of a 1 per cent. solution of cocaine hydrochloride in physiologic salt solution. This may be repeated whenever the nose is completely closed, mainly before meals. In such a solution cocaine is not toxic. [In general, it is advisable, however, not to prescribe cocaine for use by the patient himself.—Tr.]

For simple **stiffness**, one of the many *ointments* containing menthol, eucalyptol, camphor, etc., may be used. The proportion of drug in the

ointment should be low, *viz.*, 1:150, perhaps with addition of a little cocaine, thus avoiding extra irritation and favoring a decongestive and analgesic action.

℞ Eucalyptolis	0.1	c.c.	(miss);
Cocainæ hydrochloridi	0.15	gram	(gr. iiss);
Petrolati puri	15	grams	(3ss).—M.

Or:

℞ Balsami Peruviani	0.5	gram	(gr. viiss);
Petrolati	20	grams	(3v).—M.

A piece of the ointment of pea size should be drawn up into the nose five or six times a day. This should be discontinued if the nasal irritation increases.

In children, success is sometimes had by recommendation of instillation into the nostrils of a 5 per cent. solution of gomenol in oil.

Spraying of the same agents in the same strengths in liquid petrolatum is likewise in order in these cases. A small oil nebulizer should be used for this purpose. *Powders* generally yield little in the way of results. *Nasal baths* repeated several times a day, with a solution of well warmed physiologic salt solution, are excellent to open up greatly engorged nasal passages. The amount of fluid to be used each time should be about 70 cubic centimeters (2½ fluidounces). Especial care should be taken not to use pure water, even when boiled, as it is not isotonic and may do harm to the nasal epithelium.

Hot *inhalations* of a 2 per cent. solution of menthol in alcohol (one teaspoonful over very hot water) act well in relieving the hyperemia of the mucous membrane. The following combination may be used instead:

℞ Olei pini sylvestris	2	c.c.	(f3ss);
Tincturæ benzoini,			
Tincturæ eucalypti	āā	60	c.c. (f3ij).—M.

The procedure should be carefully explained to the patient.

Another, simpler form of inhalation treatment overcomes the nasal obstruction satisfactorily. It consists in placing on a handkerchief and inhaling frequently a little of the following solution:

℞ Mentholis	10	grams	(3iiss);
Alcoholis		q. s.	ad solv.

Inhalations are particularly to be recommended in the last stage of coryza, that of suppuration. In this stage, likewise, *collargol* in 5 per cent. solution may be prescribed with advantage.

For the **hydrorrhœa**, the patient may take a granule of 0.0001 gram (1/650 grain) of atropine sulphate from two to four times a day.

Headache should be combated with the usual remedies: Acetylsalicylic acid, antipyrin, amidopyrin or quinine. Other *pains* and *constitutional symptoms* call for comparative rest and appropriate treatment. Plenty of fluid, a light diet, hot beverages . . . and house slippers—these are the things which the patient finds best in mitigating his distress.

Procedures to be Avoided in Acute Coryza.—Nasal lavage, since the water streaming under some pressure through the nasal cavities may carry infected mucous material into the Eustachian tube, infect the middle ear and induce *acute otitis*.

Adrenalin solutions, since the vasoconstrictor action of this drug, while powerful, is soon followed by a vasodilatation which is worse than the original condition of obstruction. This agent, in a weak solution, should be reserved for examination of the nose and for operative work.

Forcible blowing of the nose, to avoid infecting the sinuses and especially the ear.

C. INTERNAL TREATMENT.—When acute coryza recurs frequently, even in the absence of nasal symptoms during the intervals, it is advisable during one of these intervals to practise *rhinoscopy*, which may reveal some abnormality in the nasal cavities as a cause of the recurrences. Sometimes, by the detection and correction of polyps, a septal ridge, hypertrophic rhinitis, etc., a radical cure is obtained by the removal of the cause.

If there are no such abnormalities, the patient will assert that he is very sensitive to cold. He may then be given various detailed instructions, some of which may seem rather absurd to him. The various items of clothing should be gone into—wearing flannel undergarments, warm clothes, scarfs, woolen socks, a skull-cap if bald, etc.; cold feet in bed should be remedied by the use of a hot-water bag. Lastly, he should be counselled to take a nasal bath regularly every morning with a glassful of warm saline solution. [Regular exercise in the open air and cool or cold baths every morning may usually be expected to exert some prophylactic effect.—Tr.]

CHRONIC CORYZA.

1. To be avoided:

A. Adopting an attitude of indifference to chronic coryza, as persistent as the disease itself: (a) On the ground that the physician can always relieve, if not cure such an attack of rhinitis. (b) To avoid the very frequent extension of the catarrh to the neighboring mucous membranes—ear, pharynx and larynx.

B. Prescribing ill-considered treatment and changing off indiscriminately from powders to ointments or lavage to gargles.

2. Procedures indicated:

A. Local treatment.

B. General treatment, if required.

A. Local Treatment.—*Removal of the cause* of the rhinitis should be advised (removal of adenoid vegetations or septal spurs, correction of deviated septum).

Symptomatic medication should be prescribed, consisting in restoration of nasal patency in congestive rhinitis; promoting expulsion of secretions and improving the condition of the nasal mucosa in catarrhal rhinitis, and overcoming thickenings of the mucous membrane by cauterizations or surgical measures in hypertrophic rhinitis.

If these procedures fail, a few topical applications may be made, and if these prove ineffective the patient should be referred to a specialist.

(a) **Treatment applied by the patient himself.**—The patient must be enabled to breathe through the nose freely, and consequently blow his nose. This twofold indication should be met:

1. By sniffing up *warm physiologic salt solution* into the nasal cavities morning and evening. Two teaspoonfuls of salt should be dissolved in 1 liter (quart) of boiled water and a glassful of the solution sniffed up. This isotonic solution does not injure the nasal mucous membrane and exerts a distinct decongestive effect. If ineffective, it may be replaced by a 2 per cent. solution of sodium borate.

2. By inhalation of *ointments* or *oily sprays* containing substances which act favorably on the mucosa. Thus, petrolatum containing a small amount of eucalyptol or camphor and a considerable amount of boric acid will induce secretion of mucus and promote expulsion of the secretions.

℞ Eucalyptolis	0.15 c.c.	(℥iiss);
vel Camphoræ	0.15 gram	(gr. iiss);
Acidi borici	4	grams (ʒj);
Petrolati	20	grams (ʒv).—M.

3. If the catarrhal condition is obstinate, especially in the case of a scrofulous or arthritic child, *sulphurous irrigations* twice daily should be prescribed:

℞ Sodii sulphidi	5 grams	(gr. lxxv);
Glycerini	60 c.c.	(fʒij);
Aquæ destillatæ	25 c.c.	(fʒvj).—M.

One teaspoonful of this mixture is placed in 1 liter (quart) of physiologic salt solution and nasal lavage carried out with the resulting product.

In any case, it is important that the medicinal agent used should act, not on the secretions, but on the mucous membrane itself. Accordingly, warm intranasal sprays of saline solution, alkaline solutions or 2 per cent. protargol solution may be recommended.

(b) **Treatment applied by the physician.**—In the event of failure of the foregoing measures, the following procedure may be tried about every other day for two or three weeks:

After institution of light anesthesia of the nasal cavity with cotton on an applicator moistened with a few drops of 10 per cent. cocaine solution, the mucous membrane of the turbinates, meatus and septum is painted with the following solution:

℞ Eucalyptolis	0.4 c.c.	(m.vj);
vel Camphoræ,		
vel Mentholis	0.4 grams	(gr. vj);
Petrolati liquidi	10 c.c.	(f3iiss).—M.

Or:

℞ Argenti nitratis	0.2 gram	(gr. iij);
Aquæ destillatæ	10 c.c.	(f3iiss).—S.

Instead of the above, 1 per cent. iodine in glycerin, or 2 per cent. protargol, may be used.

The sensitiveness of the mucosa should be tested, and if the reactions are too severe or results uncertain, it will perhaps be well to have the refractory nasal cavities examined by a specialist.

(c) **Treatment applied by the rhinologist.**—Unless the practitioner is trained in all the details of the procedures required and possesses the necessary armamentarium, intervention of the specialist is indicated in hypertrophic rhinitis. According to the condition existing it will be necessary:

1. To carry out *linear cauterisations* with the galvanic current all along the enlarged turbinate and to make a series of cautery applications for the purpose of destroying the hyperplastic tissue.

2. To carry out *surgical treatment* by removal of the obstructing extremities of the turbinates with the snare and the exuberant hypertrophied tissue with forceps (Fig. 290).

B. General Treatment.—Chronic coryza is connected with the pursuit of certain occupations which predispose to "colds." The patient cannot, of course, be advised to take up work elsewhere on the ground that the breathing of dust or fumes exposes him to frequent coryza. But if he is an alcohol user and indulges in tobacco, he can be advised to reduce or proscribe these toxic promoters of

congestion. He should be directed to inhale petrolatum into his nose before going to the factory in order to form a protective layer over the mucous membrane; these hygienic precautions will be found by no means useless.

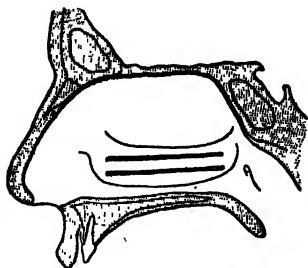


Fig. 287.—Intranasal cauterization.

Two parallel linear cauterizations with the galvanocautery have been made over the entire length of the inferior turbinate.

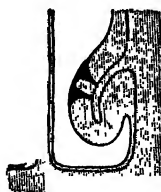


Fig. 288.

The two grooves made by the cautery are seen in a vertical cross-section of the nasal cavity.

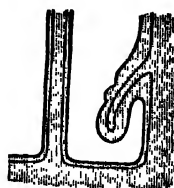


Fig. 289.—End-result of cauterization.

Thanks to the cicatricial contraction which has taken place in the soft tissues of the turbinate, the breathing space has been increased.

A laboring man cannot, of course, be advised to repair to thermal resorts when the summer season comes around. But for those in

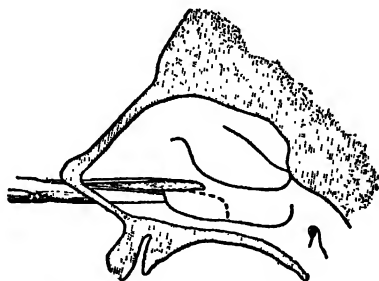


Fig. 290.—Partial inferior turbinectomy.

good circumstances a hyriatic cure such as that obtained at Mont-Dore may be of material service in congestive rhinitis; some of the sulphur waters are beneficial in children suffering from chronic coryza with impetigo, and some of the saline waters in children of the lymphatic type.

The general condition should be treated, exercise, including walking, recommended to those who are equal to it, and likewise warm hydrotherapeutic measures. All practices that may cause conges-

tion of the face should be avoided. Accordingly, the diet should be adjusted, constriction of the digestive tract eliminated, a looser corset advised if need be, suspenders for such subjects as wear a tight belt, and reduction in the amount of food taken. The kidneys of the gouty case should be flushed out. All these details may elicit a smile; but the treatment should be tried, at any rate; it is at least on a par with the macaroni treatment for enteritis and is likely to prove highly successful. The physician should not allow himself to be entirely taken up with the local lesion and harry it with all the drugs in the pharmacopeia, and especially with pharmaceutical "novelties," but should also treat the underlying condition or soil upon which it has developed.

CATARRH OF THE NASOPHARYNX.

The natural tendency of this very common disorder is toward recovery, but sometimes it induces a serious complication, *viz.*, *otitis*, in the meantime. Again, recurrence of the inflammatory exacerbations in the long run brings about hypertrophy of the adenoid tissue, whence the appearance of large adenoid vegetations, *disturbances of hearing, nasal obstruction, enteritis*, etc.

I. The physician should avoid: 1. Prescribing nasal lavage and inhalations of water, which may be the source of extreme danger to the ear. The water which passes into the nose, meeting with resistance in the nasal passages, tends to penetrate into the middle ear under pressure and infect it.

2. Advising the mother to **blow the child's nose forcibly**; here again, there is risk of infecting the ear.

3. Recommending **adenoidectomy** in these cases, for 2 reasons: (1) The operation, carried out in an infected area entails a risk of inducing *very dangerous* complications, inflammatory, hemorrhagic or septicemic. (2) Furthermore, one may reason in acute adenoiditis as in ordinary tonsillitis: How often it happens that in acute tonsillitis the tonsils are enormously enlarged and yet, when the disturbance has subsided, they return to their normal size and their removal is unnecessary. Similarly, upon recovery from the adenoid attack, there remains often so little adenoid tissue that the operation is quite unnecessary. It is indicated only if the inflammation recurs frequently.

II. The physician should prescribe: (a) *General treatment*.—The child should stay in the room, at rest in bed, without food or on a liquid diet. The bowels should be activated, if need be. Symptomatic treatment is in order.

(b) *Local treatment, viz., nasal instillations* in infancy, 3 or 4 times a day. The handkerchief having first been used, there is introduced into each nostril, with the head tilted backward, by means of a syringe such as Marfan's or simply a teaspoon, 3 or 4 drops of liquid petrolatum containing 1:150 of camphor, eucalyptol or menthol, or a 5 per cent. solution of gomenol in oil.

Ointments in like doses, if the child is older.

Emollient inhalations from some form of inhaler. To the hot water should be added a teaspoonful of tincture of eucalyptus or of

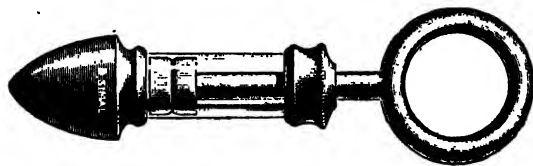


Fig. 291.—Marfan's syringe.

benzoin, 10 drops of a tincture of balsam of Peru, etc. Four or five inhalations a day should be carried out, each of five minutes' duration.

(c) To obviate too frequent *recurrence* of the attacks of acute adenoiditis, *adenoidectomy* should be recommended; if the child's general condition points to the need of it, a sulphur thermal treatment may be advised for children of the lymphatic type, or an arsenical thermal treatment for anemic children.

Course of Acute Nasopharyngeal Catarrh in the Adult.—Clinically, the condition is less common than in children; it is always con-



Fig. 292.—Spoon for nasal instillations.

sequent upon an acute coryza and the reactions are much less severe. The patient hawks, blows his nose, sniffs and expectorates viscid nasopharyngeal mucus; there is earache.

The diagnosis is readily made by anterior and posterior rhinoscopy.

As for the treatment, it should be less severe than that previously described. It will often entail the ordering of inhalations; of curettage after the subsidence of the acute condition if there are remnants of vegetations from early childhood, and nasal and general hygienic measures to avoid coryza.

ADENOID VEGETATIONS.

I. Measures to be avoided.—In children it should be made a rule never to treat symptomatically for rickets, bronchitis, recurrent sore throat, enteritis or earache without thinking of the nose, especially in the presence of some form of reaction or primary morbid focus in the nasopharynx, *however trifling* it may seem.

On the other hand, one should avoid hastily concluding from the fact that the child's mouth is open that adenoid vegetations exist, and recommending an operation without having made a local examination. This is a mistake very often made by practitioners.

II. Measures to be recommended.—(a) **Medical treatment.**—It should be kept in mind that the medical procedures are minor procedures which *have never cured* adenoid cases nor caused the vegetations to recede or disappear.

Consequently, since the physician has no means of direct action on the adenoid growths, all he can do is to try to allay the *attacks of acute adenoiditis*. This can be accomplished more or less effectually with the customary instillations and ointments, the formulas of which are known to every practitioner.

℞ Mentholis	0.15 gram	(gr. iiss);
Petrolati liquidi	20 c.c.	(f5v).—S.

Eucalyptol, camphor or gomenol may be substituted for the menthol in the same amount. Four or five drops of the preparation are to be instilled in each nostril three times a day.

℞ Mentholis	0.15 gram	(gr. iiss);
Acidi borici	4	grams (5j);
Petrolati	20	grams (5v).—M.

A piece of ointment of pea size is to be snuffed up in each nostril three times a day.

There is but one active and curative treatment, *viz.*, operation. The definite indications for it should be borne in mind.

(b) **Removal of the adenoids.**—It is difficult to teach the practitioner the technic of this operation, which must be carried out according to a certain procedure and with an aggregate of precautions and necessary details to avoid complications. It is of prime importance, however, that he should be familiar with the *indications* for it in general practice.

1. **What are the indications?**—In the *newborn*, when nursing is rendered impossible by the lack of respiration through the nose.

In the *child*, in a general way, whenever the growths cause manifestations of *nasal obstruction* (respiratory difficulties) or of *infection*, and these manifestations are persistent or recurrent.

In the *adult*, when the chronic nasopharyngeal catarrh causes ear disturbances (deafness) or laryngeal disturbances (hoarseness).

2. When the operation should not be advised.—During an attack of *acute adenoiditis*, lest septicemic or hemorrhagic complications be induced; if there is present an acute otitis or if there are home conditions (grippe running through the family) or an epidemic likely to favor infection; also if there is some serious morbid taint, such as tuberculosis.

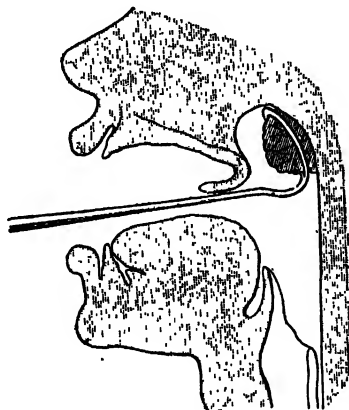


Fig. 293.—The operation for adenoid vegetations.

The patient is likely to demand of the physician answers to at least some, if not all, of the following questions:

(a) *Is the operation really necessary?* He should answer that the results will be more rapid and more thorough with the use of the curet than with codliver oil and all agents that might be instilled in the nose.

(b) *Is there a definite age when it is best to operate?* Many parents have an idea that there is a proper age at which the operation is best done and that the later the growths are taken out, the less the risk and the better the results. This is utterly absurd: There is no age of election for the operation; there are only *indications* for it. The operation is no more dangerous in a child of one or two years than it is at fifteen.

(c) *Will the vegetations not grow again if the operation is carried out too soon?* No, in the very great majority of cases, except in nursing infants.

(d) *Will the adenoids not disappear of themselves?* They will, indeed, sometimes atrophy after the age of fifteen years, but they will then have left permanent marks of their presence in the ear (deafness) or on the face (deformity), without mentioning the diseases they will have induced up to the age of puberty.

(e) *Is the operation a serious one?* The trifling risks of the operation cannot be compared with the disturbances which the presence of the growths entails. The patient will have to stay in his room for a few days, and that is all.

(f) *Is anesthesia necessary? Must a general anesthetic be used?* In the nursing infant, never. In the older child, the question is open to discussion, but anesthesia can, if desired, be dispensed with or the operation carried out under ethyl chloride. In the adult, thorough cocainization is sufficient.

DISORDERS OF THE LARYNX.

ACUTE. CATARRHAL LARYNGITIS.

Certain hygienic instructions should, in particular, be stressed:

Vocal rest, with complete interdiction of speaking above a whisper, and even of whispering unless necessary. This vocal rest constitutes three-fourths of the treatment.

The patient should stay in his *room* during the acute stage, especially in winter. He should avoid inhaling dust, tobacco smoke, alcohol and spiced foods.

Hot *foot-baths* morning and evening, for fifteen minutes. Application of hot *moist compresses* over the front of the neck four times a day, for half an hour each time.

Five times daily, *inhalation* of:

℞ Tincturæ eucalypti,
Tincturæ benzoiniāā 60 c.c. (f3ij).

M. Sig.: One teaspoonful in hot water, for inhalation.

Or, emollient inhalations may be used, *e.g.*, a decoction of poppy capsules to which are added volatile substances such as:

℞ Phenolis 0.3 gram (gr. v);
Olei terebinthinæ gtt. xv;
Aquæ laurocerasi 100 c.c. (f3iiss).

M. Sig.: One teaspoonful in hot water, for inhalation.

℞ Alcoholis,
Aquæ laurocerasiāā 60 c.c. (f3ij).

M. Sig.: One teaspoonful in hot water, for inhalation.

Treatment of the causative cough (aconite, codeine, etc.), rhinitis or pharyngitis is indicated. If cough persists and tires the patient, a good means of allaying it is to insufflate into the larynx once daily, under the control of the laryngeal mirror, an amount of the following powder equalling a pea in size :

℞ Morphinae hydrochloridi,
Acidi borici pulveris,
Lactosi pulveris,
Acaciae pulveris āā 1 gram (gr. xv).—M.
(LUBET-BARBON.)

If the hoarseness persists after recovery, the laryngeal muscles should be stimulated with strychnine :

℞ Strychninae sulphatis 0.02 gram (gr. $\frac{1}{8}$);
Aquaē 100 c.c. (f3iiss).
S. Sig.: One teaspoonful before lunch and dinner.

Massage and electric treatment of the laryngeal region will effectively combat the paresis of the vocal muscles.

CHRONIC CATARRHAL LARYNGITIS.

Curative treatment?

Palliative, perhaps. The ideal treatment, which is, however, clinically impracticable, would be to leave the larynx at rest and treat the hoarseness by temporary cessation of use of the voice. But at least the physician should reduce or eliminate all causes of local irritation (alcohol, tobacco).

The nasal passages must be suitably treated—any existing obstructions corrected, and the passages disinfected, if inflamed.

The ordering of gargles is to be *avoided* where the pharynx is healthy; to loosen mucous deposits and secretions spraying with a steam atomizer is more effective than inhalations. In the apparatus may be inserted 2 tablespoonfuls of the following:

℞ Sodii boratis 5 grams (gr. lxxv);
Tincturae eucalypti 10 c.c. (f3iiss);
Glycerini,
Aquaē āā 25 c.c. (f3vj).—M.

Spraying with very dilute alkaline solutions may also be recommended.

Injectations into the larynx carried out with a special curved oil syringe are effective. The solutions used may consist of 1 per cent. menthol or eucalyptol or 5 per cent. gomenol in oil.

Two procedures which sometimes act better than the others are:

1. *Treatment at health resorts.*—Sulphur waters are particularly indicated in the catarrhal forms of laryngitis, manifested in hypersecretion in the nasal passages, pharynx and trachea. The action of such waters should, however, be watched rather carefully in congestive patients subject to acute exacerbations.

2. *Direct applications to the larynx* by a laryngologist, involving the use of solutions of zinc chloride or silver nitrate—as employed in all chronic inflammations of the mucous membranes.

TUBERCULOSIS OF THE LARYNX.

Measures to be avoided.—To subordinate the general to the local treatment is a mistake; in this disorder the attendant should treat the condition rather as an internist than as a laryngologist.

Another mistake is to carry out *too vigorous a local treatment* with the idea of healing and disinfecting the larynx. How often has harm been done to the larynx by applications and cauterizations with a variety of caustics, with the obvious result of whipping up the laryngeal lesions! Let the physician bear in mind that active local measures in the tuberculous larynx are permissible only when the patient's general condition is very good, with freedom from fever, and lung involvement is but slight. Such cases are few.

Advising a stay at the seashore or a sulphur water cure is to be carefully avoided. One might believe the former measure indicated as a form of open air treatment; but in these cases the larynx reacts by pronounced acute congestive exacerbations.

Measures to be prescribed.—There should be, first of all, *prophylactic treatment*. The larynx should be placed in a state of defence against a possible invasion by the tubercle bacillus. Hence, strict hygienic precautions are indicated in patients with pulmonary tuberculosis: No fatiguing activities; no overuse of the voice; no tobacco and no alcohol.

The patient's *general condition* should be treated when the larynx is involved, whatever stage may have been reached. Accordingly, a rest cure in the country in a well sheltered region should be instituted, together with proper dietary measures and drug treatment if indicated.

The *local treatment* is not curative, but merely palliative and symptomatic. As with tuberculous disease situated elsewhere, cases of recovery are observed and recorded, but they are not numerous. The practitioner should base his estimates not on the exceptions, but on the general run of cases.

The relative ineffectiveness of local treatment, in general, in laryngeal tuberculosis is to be kept in mind. It may well be limited to local sedative measures—if, indeed, such symptomatic relief proves feasible at all.

1. For the hoarseness and cough absolute *rest of the voice* is necessary. The patient should restrict his talking to whispers. A fairly good means of obviating cough consists in recommending, at the moment when the pricking sensation which brings it on sets in, that the patient close his mouth and execute short jerky inspirations through the nose.

2. For the ulcerations and discharge one may prescribe either *inhalations*, or better, *spraying* with *alkaline* solutions in the steam atomizer:

℞ Sodii benzoatis	5 grams (gr. lxxv);
Tincturæ eucalypti	10 c.c. (f3iiss);
Glycerini	30 c.c. (f3j);
Aquæ	450 c.c. (Oj).—M.

Phenol solutions may also be used:

℞ Phenolis	1 gram (gr. xv);
Cocainæ hydrochloridi	0.5 gram (gr. viiss);
Glycerini	20 c.c. (f3v);
Aquæ	300 c.c. (f3x).

M. Sig.: One tablespoonful in the steam atomizer. Use the spray four or five times a day.

Inhalations of preparations containing balsam of Peru, and especially menthol, are particularly indicated; menthol, indeed, is both antiseptic, analgesic and vasoconstrictor:

℞ Mentholis	2 grams (3ss);
Balsami peruviani	4 c.c. (f3j);
Tincturæ eucalypti	10 c.c. (f3iiss);
Alcoholis	120 c.c. (f3iv).—M.

3. For the pain and dysphagia, an anodyne spray to be used several times a day, preferably before meals, may be ordered:

℞ Morphinæ hydrochloridi	0.4 gram (gr. vj);
Antipyrinæ	3 grams (gr. xlv);
Aquæ	100 c.c. (f3iiiss).

S. Sig.: Pour one teaspoonful into the atomizer.

The swallowing of certain drugs in the dry form is sometimes effective in allaying the painful dysphagia of patients with laryngeal tuberculosis. The procedure is as follows: The patient places on his tongue, preferably over its base and as near as possible to the isthmus of the fauces, a definite quantity of the powder prescribed, *e.g.*, 0.4 gram (6 grains) of orthoform. He is instructed then to swallow it, without using any fluid, executing several swallowing movements.

The drug becomes deposited about the upper orifice of the larynx, coating the ulcerations, the infiltrated portions of the epiglottis and the arytenoepiglottic fold. After a few minutes he is sometimes enabled to swallow without pain. The procedure may be repeated three or four times a day. It can prove successful, however, only when the disease is confined to the upper orifice of the air-tract.

An excellent procedure to allay dysphagia consists in *inhalations into the larynx* by the tube method of Leduc.

Without the physician's assistance, the patient is thus enabled to introduce into the larynx as often as required, with all due safety, a medicinal powder which he inhales and which coats the laryngeal vestibule as though dusted over it from a sieve, as may be demonstrated by direct inspection.

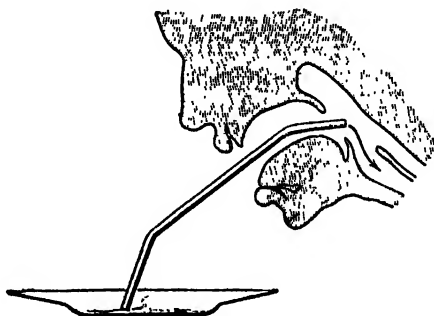


Fig. 294.—Inhalation into the larynx by the method of Leduc.

Several times a day, preferably ten minutes before meals, the patient deposits on a plate an amount of anesthetic powder corresponding in size to a pea. He inserts one end of the bent tube deeply into the throat, places the other end over the surface of the powder, and inhales suddenly.

The following formulas are used for the purpose:

℞ Diiodoform 8 grams (3ij);
Cocainæ hydrochloridi 0.08 gram (gr. $\frac{1}{4}$);
Morphinæ hydrochloridi 0.04 gram (gr. $\frac{1}{20}$).—M.

Or:

℞ Orthoform,
Diiodoform,
Acaciæ āā 5 grams (gr. lxxv).—M.

Or:

℞ Cocainæ hydrochloridi,
Morphinæ hydrochloridi āā 0.5 gram (gr. viiss);
Lactosi,
Acaciæ āā 5 grams (gr. lxxv).—M.

In the event of asphyxia, *injections of morphine* are to be preferred to tracheotomy in these cases. While ostensibly carried out to prevent the cachectic tuberculous patient from dying of suffocation, it results in infec-

tion, makes him cough and compels him to undergo painful redressings. *Tracheotomy* should be reserved, then, for cases of stenosis of the glottis due to vegetations or ankylosis of the arytenoids and at the very start of the disease, when the general condition is still relatively good. Introduction of the cannula under these circumstances rests the laryngeal lesions and very markedly reduces the cough and dysphagia.

That I make no reference to the laryngologic treatment of tuberculosis of the larynx is done for a purpose. I cannot conceive of the country practitioner being fitted out for cauterizations with lactic acid (entailing a risk of causing spasm of the glottis), scarifying or punching out an infiltrated epiglottis, treating the arytenoid cartilages with the actual cautery, or even practising thyrotomy, as has been proposed.

It would appear, however, that in some vegetative forms of the disease, in tuberculous cases possessed of high resisting power and with restricted pulmonary disease, deep galvanocauterization, with or without preceding curettage, yields appreciable results. It is therefore necessary that the practitioner should recognize these forms from the start, in order that the treatment of choice may be applied in time.

Two new methods seem to be of real efficacy in the treatment of laryngeal tuberculosis: Heliotherapy and anesthesia of nerve-trunks.

1. **Heliotherapy.**—The results obtained in lupus by light treatment led to the application of this method to the treatment of tuberculous laryngitis. An analgesic effect on the part of the light rays and healing of the ulcers are asserted to have been witnessed by the sponsors of this procedure. Following are the more essential details of the technic:

The patient, seated on his steamer chair or even recumbent, in the shade, sets up in front of him a mirror, freely adjustable in all positions, and placed in the sun. He next directs towards himself the rays reflected from the mirror, opens his mouth and puts out his tongue as though for a laryngoscopic examination. With the right hand he introduces into his pharynx the laryngeal mirror, previously rubbed with soft soap and wiped off, to prevent its being clouded by the moisture in his breath, and then projects the sun's rays into his larynx. The direction of the rays is readily controlled by means of a small mirror held in the left hand; in this small mirror, placed in the required position, can be seen the laryngeal mirror applied over the uvula, and by reflection in it, the illuminated area of the larynx.

By virtue of a special, improved device, the illuminating mirror and the control mirror can be attached to a movable rod.

The duration of the exposures ranges from a few minutes to a half hour or one hour.

The most favorable periods of the day for the treatment are the early morning and the late afternoon, in the summer, as there are then less of the heat rays. Rays that are too intense must, indeed, be avoided on account of the resulting vasodilatation in the tissues, which might be prejudicial. The prevailing view is that it is not the heat rays which are therapeutically active, but rather the chemical rays.

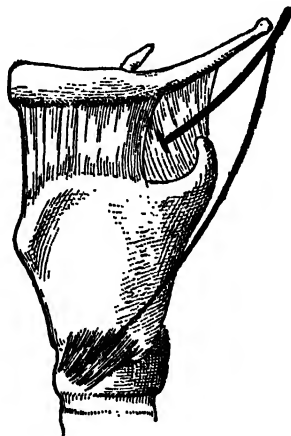


Fig. 295.—Showing the superior laryngeal nerve and its division into two branches. The upper branch passes through the thyrohyoid membrane, while the lower branch, or external laryngeal nerve, passes down over the lateral aspect of the larynx.

This heliotherapeutic treatment should preferably be carried out in the mountains.

The rays from an arc light, concentrated by a quartz lens, have sometimes been substituted for the direct sunlight (Nepveu).

Climatic Treatment.—There is no thermal resort that is indicated for cases of laryngeal tuberculosis. The sulphur waters are particularly contraindicated. The open air treatment, however, cannot be too strongly recommended, especially the winter resorts at an elevation, provided the pulmonary lesions are not such as to render such a procedure inadvisable. Dust, high wind and abrupt changes of temperature are harmful to these patients and should be warned against.

2. Anesthesia of Nerve-Trunks.—The laryngologists, mindful of the treatment of tic douloureux, sciatica, etc., in this manner, have

endeavored, with marked success, to do away with the dysphagia of tuberculous cases by inducing anesthesia of the sensory nerve of the larynx, *viz.*, the superior laryngeal nerve, by *physiologic section* of this nerve by the injection of cocaine or alcohol.

Anatomic Features.—The superior laryngeal nerve divides into two branches behind the hyoid bone. The lower branch or external laryngeal nerve is of no significance in this connection; the upper branch, however, plays the chief rôle in the dysphagia of tuberculous cases, as it is exclusively sensory in function. Its course is parallel to the greater cornu of the hyoid bone, between it and the upper border of the thyroid cartilage; it is covered by the thyrohyoid muscle and rests upon the thyrohyoid membrane. It perforates this membrane and enters the larynx at the junction of its middle and lower thirds, about $2\frac{1}{2}$ centimeters from the median line and nearly 1 centimeter in front of the greater cornu of the thyroid.

Technic.—With an ordinary hypodermic syringe, one may inject either 1 or 2 cubic centimeters (16 or 32 minims) of 1 per cent. cocaine solution, or 1 cubic centimeter of 60 or 80 per cent. alcohol with addition of 1 per cent. stovaine [or procaine] and warmed to 45° C. (113° F.).

The skin over the larynx is painted with tincture of iodine. The patient sits with his head slightly raised and resting on the back of the chair. If he is in bed, his head should be placed in moderate extension.

There are several landmarks that may be selected from. The needle may be introduced in the median line of the neck at a point $\frac{1}{2}$ centimeter ($\frac{1}{8}$ inch) above the upper border of the thyroid cartilage. It is inserted to a depth of $\frac{1}{2}$ centimeter until it is arrested by the thyrohyoid membrane, which is rather thick at this point. A few drops of the fluid are next injected with the point directed slightly outward and upward, in order to establish a plane of cleavage between the muscle and the membrane. The direction of the needle is then changed; it is introduced horizontally backward and outward, parallel to the upper border of the thyroid cartilage and $\frac{1}{2}$ centimeter above it. Proceeding along this course the needle soon meets the nerve at a distance of $2\frac{1}{2}$ centimeters (1 inch) from the median line and causes a sharp pain in the ear, together with local pain. The contents of the syringe is now injected. Both sides can be dealt with without completely removing the needle. There is no risk of wounding vessels (P. Boncour). The patient should be instructed not to swallow nor talk at any time during the procedure of injection, in order not to displace the needle from its proper path.

Following is another procedure, as described by Frey and Valentin: The greater cornu of the hyoid bone and the postero-superior angle of the thyroid cartilage are located with the forefinger of the right hand, and the needle introduced below the middle of a line joining these two points. In order to bring out the cartilages more clearly (an easy matter in tuberculous cases with scrawny necks) the larynx is pushed toward the side to be dealt with by the left hand. Sometimes it happens that the right forefinger provokes a sharp pain in the course of the palpation: This is the point where the injection should be given; the nerve is certain to be encountered at this location. If not, the needle is pushed in at right angles to the

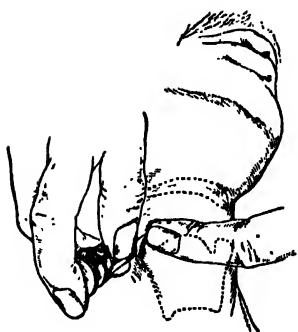


Fig. 296.—Technic of injection of the right superior laryngeal nerve.



Fig. 297.—Technic of injection of the left superior laryngeal nerve.

While the left forefinger locates the nerve trunk, the analgesic solution is injected with the right hand.

skin surface to a depth of 1 to $1\frac{1}{2}$ centimeters ($\frac{3}{8}$ to $\frac{3}{16}$ inch), passing through the skin, cellular tissue, aponeurosis and muscles. It is then tilted slightly in various directions until the nerve is encountered, as indicated by a sharp pain in the ear and pain in the throat. Two cubic centimeters (32 minims) of fluid are injected at this point.

No serious untoward result can attend this procedure. Anesthesia of the larynx sets in two to five minutes after the injection. The duration of the anesthesia is variable; it persists for from a few hours to eight, ten or even fifteen days. In some cases the results are very striking: Immediately after the injection the patient is able to take food, the dysphagia disappears and rest is insured. The procedure is repeated as soon as the effect has worn off, as often as required; no harm results. In a few cases the procedure fails com-

pletely, either because of faulty technic or for some reason of an anatomic order.

Under such conditions section of the superior laryngeal nerve has been advocated and carried out with success.

TREATMENT OF DISORDERS OF THE LOWER RESPIRATORY PASSAGES (BELOW THE LARYNX).

(Written with the collaboration of M. SÉGARD, M.D.)

TRACHEITIS.

ACUTE TRACHEITIS.

This is a common disorder, appearing after exposure to cold or the inhalation of irritating dust, gases or fumes. It is becoming increasingly frequent in large cities, where the air is polluted with dust and the exhaust gases from automobiles. Tracheitis also occurs as an ordinary symptom in influenza, measles and, in general, in all the infections attended with fever.

The symptoms of acute tracheitis are not always differentiated from those of pharyngitis or of acute bronchitis. Indeed, tracheitis is frequently combined with disturbances in these two situations.

Cough is the predominant symptom: At first a dry cough, then followed by mucopurulent expectoration. Schiffrers notes that the cough assumes a particularly paroxysmal nature when the inflammation of the mucous membrane approximates the bifurcation of the trachea. There is little or no fever. If the patient were subjected to laryngoscopic examination, the redness of the mucosa could readily be verified.

As a general rule, acute tracheitis runs a course of about two weeks, unless the inflammation passes into a state of chronicity.

Therapeutic Indications.—1. Allay the cough when it is very distressing (granules of diacetylmorphine or a liquid preparation containing codeine).

Granules of aconite and drosera and tablets combining codeine with bromoform give gratifying relief.

2. Counterirritation over the pretracheal region by means of hot compresses applied over the sternum.

3. Promote loosening of the secretions by inhalations of hot vapors. A small amount of sodium bicarbonate, sodium chlorate or

borax should be added to the boiling water from which the steam is to be inhaled. Water containing eucalyptus leaves should be heated to a boil for five minutes in a pan every hour in the sickroom.

CHRONIC TRACHEITIS.

While generally combined with a chronic infection of the bronchi or nasopharynx, chronic tracheitis may occur independently in certain neuro-arthritic, gouty, and especially diabetic cases. In the patients with glycosuria it is particularly obstinate and refractory to all forms of treatment; the severity of the cough parallels the amount of sugar in the urine and the dietary indiscretions.

Chronic tracheitis is also common in smokers and in persons whose occupation requires the use of the voice. Vocal fatigue, exposure to cold or excessive use of tobacco exposes these patients to subacute exacerbations of tracheitis which may become complicated, by downward extension, with acute bronchitis.

In a person having a chronic cough, the diagnosis of tracheitis is rather often a diagnosis by exclusion. Clinical examination will have revealed nothing abnormal in the chest, pharynx nor larynx. There is no need to confirm by tracheobronchoscopy the redness of the tracheal rings.

Cough is the sole symptom, and is persistent, tiring, sometimes dry, at other times followed by the expectoration, with much difficulty, of small, pearl-like or clumped sputa. A slight sensation of presternal weight or indefinite oppression are complained of by some patients.

Treatment.—The following measures may be employed in combating this discouragingly persistent disorder:

1. On awakening and before retiring: An **inhalation** of the steam from boiling water to which have been added alkalies and balsamic agents (eucalyptus leaves, tincture of eucalyptus, tincture of benzoin).

2. **Insufflation** with the laryngeal powder-blower of a finely divided soothing powder. The practitioner may readily make use of the Moritz-Schmidt insufflator, containing a pinch of the following powder:

℞ Acidi borici pulveris,
Lactosi,
Tragacanthi,
Morphinæ hydrochloridi 2.5 grams (gr. xl).—M.

3. **Intratracheal injections** of 2 cubic centimeters (32 minims) of 5 per cent. gomenol or 3 per cent. guaiacol in oil, on alternate days. (See Part II: *Therapeutic Procedures*.)

About ten such injections may be appropriately given; they are generally well borne by the patient.

4. In the event of **subacute exacerbations**, expulsion of the adherent secretions should be promoted by giving a liquid preparation containing ammonium acetate.

Cough paroxysms are satisfactorily allayed by bromoform, codeine, or a combination of these two drugs.

5. **Vaccine therapy** may be tried. Some of the mucous secretion from the larynx and trachea is collected by swabbing and an autogenous vaccine prepared from it.

6. The best treatment for cases of cough due to tracheitis, however, is a **hydriatic cure**, especially at one of the sulphur water resorts. The drinking and the inhalation of sprays of the sulphur waters, together with tepid hydrotherapeutic measures, constitute the best preventive treatment of attacks of tracheitis.

Diathetic disturbances in the individual suffering from tracheitis may be treated, according to existing indications, by a diuretic cure, an alkaline cure (*e.g.*, Vichy or Vals), a detoxication cure (Brides) or a low blood-pressure cure (Royat).

ACUTE BRONCHITIS.

It is altogether proper, for the purposes of clinical therapeutics, to divide the cases of acute bronchitis into the following groups:

1. **Acute primary tracheobronchitis**.—This is the ordinary form, the “heavy cold,” or “vernacular” bronchitis which corresponds to an inflammation (congestion and infection) of the upper bronchial channels (trachea and large and intermediate extra-lobular bronchi).

2. **Capillary bronchitis**, extending to the lower (inter- and intra-lobular) bronchi.

Aside from the foregoing pathologicoclinical groups, it seems well to set apart for special study:

3. **Acute secondary bronchitis**, which may, to be sure, assume one of the pathologic forms already mentioned, but which is manifestly dependent upon some general infection such as measles, influenza, typhoid fever, diphtheria, etc. The etiologic feature implicates a special clinical course and special therapeutic indications.

Finally, the “soil” upon which the bronchitis is superimposed, the age, a diathetic condition or the earlier condition of the respiratory, circulatory or renal tract may cause the bronchitis to run a special course and require appropriate treatment. It is therefore necessary to set apart also:

4. **Special clinical forms of acute bronchitis** relating to the age, to diathetic states or to intercurrent diseases.

ORDINARY ACUTE PRIMARY TRACHEOBRONCHITIS.

The primary forms of tracheobronchitis are the commonest, most frequent disturbances of the respiratory tract. They are often associated with or consecutive to nasopharyngitis. They generally remain localized in the upper respiratory channels.

THERAPEUTIC INDICATIONS.—These correspond to three well-known stages in the course of tracheobronchitis.

1. Stage of onset or hyperemia.
2. Stage of suppuration or fastigium.
3. Stage of decline, repair or desiccation.

I. In the **first stage** the indications are:

1. To *combat the congestion of the bronchial mucosa*, which is particularly marked and distressing in this stage.
2. To *allay cough* that is irritating and useless.
3. To *combat the general infection* and its *manifestations*.
4. To *combat the infection of the nasopharynx* which generally accompanies the tracheobronchial infection.

1. **The congestion of the bronchial mucosa is to be combatted:**

(a) By promoting *cutaneous vasodilatation* and *deep vasoconstriction* by counterirritation by means of one of the numerous measures commonly availed of for such a purpose: Mustard applications, poultices, mustard foot-baths, wrapping the legs with cotton, cupping, moist packs about the chest, and even, particularly in children, warm baths (35 to 38° C.—95 to 100.4° F.).

Moist packing of the chest, including especially *warm compresses* over the chest, is of unequalled service, allaying the cough, liquefying the bronchial mucus, dispelling dyspnea and mitigating the retrosternal discomfort. Patients always remark that they feel much better after it. The measure is particularly to be recommended in infantile bronchitis.

In *children*, if the bronchitis shows the least tendency to extend, *warm baths* should be instituted without hesitation. This is still the best preventive measure against capillary bronchitis and bronchopneumonia. In the twenty-four hours there should be given one or two five-minute baths at 35° C. (95° F.), terminating in a brief ablution of the head and back of the neck with water at 25° C. (77° F.). The child is then dried and wrapped in a woolen blanket for the next half hour, dried again and dressed in warmed clothing.

(b) By instituting *diaphoretic medication*, consisting essentially in the giving of *hot infusions*, with addition, if need be, of some diffusible stimulant of the type of *alcohol* or *ammonia* (*Spiritus ammonia anisatus*, N.F.). This is the old and popular, but rational practice of "sweating."

Infusions of elder flowers (*Sambucus*, N.F.), borage flowers, adiantum, eucalyptus leaves, mallow flowers, violet flowers, pectoral species (*Species pectorales*, N.F.) and hyssop are among the possibilities in this connection. They should be prepared when required by simply infusing 5 to 10 grams (75 to 150 grains) of the drug selected in 1 liter (quart) of boiling water for half an hour; they are then filtered or passed through a sieve and administered hot, sweetened with honey, sugar or some medicinal syrup.

Alcohol may be administered as a stimulant and diaphoretic in the form of weak grogs, or better, in combination with the foregoing infusions in the form of brandy, rum or some simple elixir.

With it may be readily combined, if need be, ammonia or ammonium salts, as in the two following typical formulas:

- R. Ammonii acetatis 4 grams (3j);
 Spiritus vini vitis 60 c.c. (f3ij);
 Syrupi adianti (10 per cent.) 75 c.c. (f3iiss).
 M. Sig.: Tablespoonful doses, in a cupful of hot infusion, three or four times a day.
- R. Olei anisi 1 c.c. (m xvj);
 Aquæ ammoniac 12 c.c. (f3iij);
 Alcoholis 24 c.c. (f3vj).
 M. Sig.: Fifteen to 25 drops four times a day in a cup of hot infusion or a little water sweetened with sugar.

This diaphoretic procedure is especially useful the first two or three days.

2. The cough is to be allayed:

(a) BY WARDING OFF ALL CAUSES OF TRACHEOBRONCHIAL IRRITATION.
 This is obtained:

1. By *confining the patient to his room* and even to his bed in order to avoid any sudden change of temperature, to which he is particularly sensitive in this stage.

2. By *forbidding him to talk* except when it is absolutely necessary. It is a matter of common observation that talking increases cough.

3. By *forbidding the entrance of smokers into the patient's room*, and *a fortiori*, forbidding him to smoke himself.

4. By *providing a moist, aromatic atmosphere*.

The air in the room should be rendered moist, and consequently more bland, by saturating it with steam obtained by boiling water near the patient's bed in a large pan.

It is customary and advisable to mix with the steam balsamic principles—probably beneficial—by the addition of eucalyptus leaves, tincture of benzoin, oil of turpentine or a compound aromatic mixture such as the following:

℞ Eucalyptolis	5 c.c. (℥lxxv);
Olei terebinthinæ	10 c.c. (f5iiss);
Tincturæ benzoini	20 c.c. (f3v);
Alcoholis	40 c.c. (f3x).

M. Sig.: For external use. One teaspoonful in a liter of water, for vaporization.

(b) BY THE ADMINISTRATION OF SEDATIVE DRUGS.

Those most commonly used and most effective are, as is well known, the *opiates* (opium and its derivatives, morphine, codeine, ethylmorphine hydrochloride, diacetylmorphine, etc.; see *Opium* and *Cough*). Especial caution in their use is necessary, however, in children, aged persons, and cases of liver or renal disease. With them may be combined various other sedatives, of which the ones most used are *aconite*, *belladonna*, *hyoscyamus*, cherry-laurel water, bromoform, etc.

The formulas are subject to endless variations both through changes in the relative amounts of the different components and the adjunction of various other antipyretic and sedative drugs such as antipyrin; expectorants, such as senega, sodium benzoate and sulphurated antimony, and heart stimulants such as alcohol, digitalis, caffeine, sparteine, etc.

Various examples of such formulas will be found in the special section on *Cough*.

3. **General infection and its manifestations are to be combatted by the administration of a *purgative*, which is all the more opportune in that tracheobronchitis is almost sure to be accompanied by a varying degree of gastrointestinal infection, and by the administration of an *antipyretic-analgesic*.**

(a) I prefer the *saline purgatives*: Magnesium sulphate, magnesium citrate, magnesium tartrate (30 to 50 grams—1 to 1½ ounces), and purgative mineral waters.

(b) As for the *antipyretic-analgesics*, one may use quinine, antipyrin, acetphenetidin or amidopyrin. I generally use a combination of ex-algin, acetphenetidin, antipyrin and quinine with addition of a small dose of a heart-stimulant, caffeine, intended to antagonize the neuro-cardiac depressant action exerted by the aniline derivatives and antipyrin. Following is a typical combination:

℞ Caffeinae	0.05 gram (gr. $\frac{1}{4}$);
Exalgin	0.1 gram (gr. iss);
Acetphenetidini	0.2 gram (gr. ii);
Quininae dihydrochloridi	0.3 gram (gr. ivss);
Antipyrrinae	0.4 gram (gr. vj).

Pone in cachet. No. i. Da tal. No. iii.

Sig.: One cachet in the afternoon on three successive days.

The above formula, like others previously given, need not be adhered to rigidly; its qualitative and quantitative composition may be altered in various ways. (See Part I: *Analgesics and Antipyretics*.)

(c) Throughout this stage the *diet* should be light, consisting mainly of liquid articles such as milk preparations, soups, vegetables reduced to a creamy consistency and fruit marmalades, and divided into

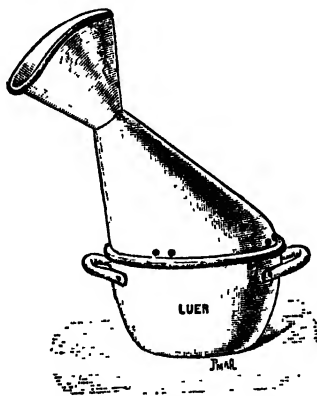


Fig. 298.—Nicolai's inhaler.

small meals taken at regular intervals, in order to avoid the unpleasant congestive exacerbations which, in this stage, follow the ingestion of a somewhat hearty meal.

4. The concomitant nasopharyngeal infection is to be combatted.

This indication I meet by having the patient *gargle* and *inhale* the following mixture:

℞ Olei illicii anisati	
[vel Anetholis (N. F.)]	gtt. xx;
Mentholis	1 gram (gr. xv);
Phenylis salicylatis	4 grams (3j);
Alcoholis	100 c.c. (f3iiss).

M. Sig.: For external use. One teaspoonful in a cup of boiling water for nasobuccal *inhalations* (10 minutes) and for *gargling* (when the solution has cooled down); this procedure to be repeated four to six times a day.

After the inhalations and gargling have been carried out, the nostrils are coated with *sterilized, borated, camphorated or resorcinolated vaselin*

(1:40) from the original *tube*, care being taken to pass the outlet of the tube through the flame of an alcohol lamp before and after use.

For the inhalations an ordinary cup may be used, or one of the various inhalers on the market (Fig. 298).

In cases where the infection of the nasopharynx is more pronounced or more refractory it will be well to have the patient spray medicated oils into the nasopharynx three or four times daily by means of a suitable nebulizer (Figs. 299 and 300).



Fig. 299.—Nebulizer for mentholated oil.



Fig. 300.—Ruault's nebulizer.

The following preparation has given the best results, in my experience:

℞ Resorcinolis	2 grams (3ss);
Olei cinnamomi	2 c.c. (f3ss);
Petrolati liquidi	60 c.c. (f3ij).

M. Sig.: For external use.

Condensing the foregoing therapeutic data for practical, clinical purposes, we obtain the following:

Outline of instructions for a case of acute bronchitis of intermediate severity in the stage of hyperemia in an adult, for the first two or three days.

I.—INTERNAL MEASURES.

1. Every four hours (7 and 11 a.m., 3 and 7 p.m.) give a cup of hot infusion of pectoral species [*Species pectorales*, N. F.] with addition of one dessertspoonful of brandy and a tablespoonful of the following syrup:

℞ Tincturæ aconiti	2.5 c.c.	(m xl);
Aquæ laurocerasi	8 c.c.	(f3ij);
Sodii benzoatis	8 grams	(3ij);
Syrupi codeinæ (N. F. IV),		
Syrupi senegæ,		
Syrupi tolu	āā 40 c.c.	(f3x).—M.

2. At 10 a.m. and 4 p.m. on the first day, and at 2 p.m. on the two succeeding days, one of the following cachets:

℞ Caffeinæ	0.05 gram	(gr. $\frac{3}{4}$);
Quininæ dihydrochloridi	0.25 gram	(gr. iv);
Antipyrinæ	0.5 gram	(gr. viiss).

Pone in cachet. No. i. Da tal. No. iv.

3. A tumblerful of Rubinat or other purgative mineral water, to be taken one morning.

4. A light diet: Milk, milk preparations, soups, vegetables and fruits, in four small meals (8 a.m., noon, 4 and 8 p.m.).

II.—EXTERNAL MEASURES.

1. Mustard poultices, or *better*, moist packs about the chest from 7 to 10 a.m. and 7 to 10 p.m. and also, if necessary, a third time in the interval, from 1 to 4 p.m.

2. Before each dose of infusion, *inhalation*, followed by *gargling*, with a cup of very hot water to which has been added one teaspoonful of the following mixture:

℞ Olei illicii anisati,		
[vel Anetholis (N. F.)]	gtt. xx;	
Mentholis	1 gram	(gr. xv);
Phenylis salicylatis	4 grams	(3j);
Alcoholis	100 c.c.	(f3iiiss).

M. Sig.: For external use.

3. Apply in the nostrils:

℞ Resorcinolis	2 grams	(3ss);
Olei cinnamomi	2 c.c.	(f3ss);
Petrolati liquidi	60 c.c.	(f3ij).

M. Sig.: For external use.

III.—GENERAL HYGIENIC MEASURES.

1. Patient to stay in bed.

Temperature of the room to be kept at about 18° C. (65° F.).

Ventilation to be as thorough as possible, but with avoidance of draughts.

Continuous fresh air, if the climate, season and room permit of it.

Production of smoke and raising of dust to be carefully avoided.

Patient to talk as little as possible.

2. Evaporate water containing eucalyptus leaves in the sickroom and place cloths moistened with oil of turpentine around the patient's bed.

* * *

Following is another outline of treatment for a similar case:

Treatment of Acute Bronchitis.

I. First Stage (Hyperemia):

1. *Combat the hyperemia*, in accordance with its severity, by the application of mustard poultices, moist packs about the chest, wrapping cotton about the legs, and warm baths (38° C.—100.4° F.).

2. *Allay the cough* (useless in this stage) and *promote the onset of expectoration* (passage into the next stage) by the combined administration of *sedatives*, such as aconite, codeine, cherry-laurel water and bromoform, and *expectorants*, such as senega, sodium benzoate and sulphurated antimony.

For example:

℞ Æthylmorphinæ hydrochloridi	0.08 gram	(gr. $\frac{1}{4}$);
Tincturæ aconiti	2.5 c.c.	($\frac{1}{2}$ xl);
Sodii benzoatis	8	grams (3ij);
Syrupi senegæ,		
Syrupi tolu	āā 30	c.c. (f3j);
Aquæ tiliaë	80	c.c. (f3iij).

M. Sig.: Four tablespoonfuls in 24 hours, between meals, in an infusion of pectoral species (prescription for two days).

3. *Combat*, if indicated, *general infection and fever* with a *saline purgative* and an *antipyretic*:

℞ Quininæ dihydrochloridi,	
Antipyrinæ	āā 0.6 gram (gr. x).

Pone in cachet. No. ii.

Sig.: One cachet about 2 P.M. on the first and second days, with a cupful of hot infusion.

4. *Correct the irritating dryness of the air* by boiling near the patient's bed water containing eucalyptus leaves and tincture of benzoin.

II. Second Stage:

The fever has now subsided, general malaise is much reduced, the infection is manifestly declining, cough is more frank and moist, expectoration sets in, and bronchial hyperemia is less intense.

1. **The chief indication is to facilitate expectoration.** Expectorant medication now assumes the main rôle. In a somewhat later period, to be described along with the stage of decline or drying up stage, healing balsamic medication should be combined with it.

The most frequently used EXPECTORANT AGENTS are *sodium benzoate*, *ipecacuanha*, *Dover's powder*, *potassium iodide*, and *sulphurated antimony*.

A description of these agents, with formulas relating to them, will be found in Part I: *Expectorants*.

Following, by way of illustration, are a few expectorant combinations which may be suitable in this stage:

Pills:

℞ Sulphuris præcipitati 0.025 gram (gr. $\frac{1}{40}$);
 Olei anisi gtt. ij;
 Benzoini,
 Ammoniaci āā 0.05 gram (gr. $\frac{3}{4}$);
 Pulveris ipecacuanhæ et opii 0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xx.

Sig.: Five or six pills a day between meals (one hour before or two hours after meals).

Or:

℞ Extracti aconiti 0.01 gram (gr. $\frac{1}{10}$);
 Sodii benzoatis,
 Pulveris ipecacuanhæ et opii,
 Picis pini āā 0.05 gram (gr. $\frac{3}{4}$).

Ft. pil. No. i. Da tal. No. xx.

Sig.: Three to six pills a day between meals.

Cachets:

℞ Quininæ sulphatis 0.2 gram (gr. iij);
 Sodii benzoatis,
 Pulveris ipecacuanhæ et opii āā 0.4 gram (gr. vj).

Pone in cachet. No. i. Da tal. No. xx.

Sig.: Three cachets in 24 hours with a cup of aromatic infusion between meals.

Mixtures:

℞ Sodii benzoatis,
 Ammoniaci āā 5 grams (gr. lxxv);
 Antimonii sulphurati (N. F. IV) 0.5 gram (gr. viiss);
 Emulsi amygdalæ 60 c.c. (f $\frac{3}{4}$ ij);
 Syrupi acaciæ 15 c.c. (f $\frac{3}{4}$ ss);
 Aquæ destillatæ 75 c.c. (f $\frac{3}{4}$ iiss).

M. Sig.: Four tablespoonfuls a day between meals.

℞ Extracti opii (N. F.),
 Antimonii sulphurati (N. F. IV) āā 0.15 gram (gr. iiss);
 Potassii iodidi 0.5 gram (gr. viiss);
 Aquæ laurocerasi 20 c.c. (f $\frac{3}{4}$ v);
 Syrupi acaciæ 45 c.c. (f $\frac{3}{4}$ iiss);
 Aquæ destillatæ q. s. ad 200 c.c. (f $\frac{3}{4}$ viiss).

M. Sig.: Three tablespoonfuls a day between meals.

2. The hyperemic condition being now less marked, the revulsive measures mentioned in relation to the initial stage may be replaced by *applications of tincture of iodine* or by *chest rubs* with aromatic preparations, *e.g.*, with oil of turpentine diluted with alcohol, or mixtures of alcohol with other aromatic rubefacients.

3. There is every advantage in continuing the measures relating to the nasopharynx, already described.

4. The *diet*, while still light, may be brought back more nearly to the normal: Light soups made with chicken bouillon, or lean soups, boiled eggs, fowl, vegetable purées, fruit marmalades and infusions.

5. It is advisable for the patient still to remain in his room, with the vaporization continued therein; he may, however, leave his bed, walk a little, read, write—in short, partly resume his customary occupation.

* * *

Applying the foregoing data to the treatment of an adult case of acute bronchitis of intermediate severity that has reached the **stage of suppuration**, we obtain the following typical **outline of instructions**:

I.—INTERNAL MEASURES.

1. Every four hours (7 and 11 a.m., 3 and 7 p.m.), along with a cupful of infusion, one of the following pills:

℞ Sulphuris præcipitati	0.025 gram (gr. $\frac{1}{4}$);
Olei anisi	gtt. ij;
Benzoini,	
Ammoniaci	āā 0.05 gram (gr. $\frac{1}{4}$);
Pulveris ipecacuanhæ et opii	0.1 gram (gr. iss).
Ft. pil. No. i. Da tal. No. xx.	

2. Small meals at 8 a.m. and 4 p.m.: Tea or coffee with milk and crackers.

Larger meals at noon and 7 p.m., consisting of soups, eggs, vegetables and fruits or creamy desserts.

II.—EXTERNAL MEASURES.

1. *Chest rubs* morning and evening with a mixture of turpentine and spirits of various aromatic drugs such as lavender and rosemary.

℞ Spiritus terebinthinæ (16 per cent.),	
Spiritus lavandulæ,	
Spiritus rosmarini	āā 50 c.c. (f $\frac{3}{4}$ iss).
M. Sig.: For external use.	

2. The *inhalations* and *gargling* carried out in the preceding stage are to be continued.

III.—GENERAL HYGIENIC MEASURES.

1. Remain in the room.
2. Continue the vaporizations.
3. No smoke and no dust.

III. Stage of Decline.—In this, the stage of repair or “drying up,” the constitutional manifestations have practically disappeared, the cough is productive and less distressing, and the expectoration continues more or less abundant.

The main indication is to promote the process of repair and drying up in the bronchi, reducing the suppuration and at the same time facilitating expulsion.

Expectorants are still in order, but it is the *balsamic* expectorants (turpentine, terpin hydrate, creosote and guaiacol) which are of most service in this stage, and later the *sulphur* preparations.

Pills:

℞ Terebinthinæ 0.15 c.c. (m̄iiss);
Sodii benzoatis,
Magnesii carbonatis āā 0.15 gram (gr. iiss).
Ft. pil. No. i. Da tal. No. c.
Sig.: Six to fifteen pills a day.

Syrup.—A 10 per cent. simple syrup of turpentine may be ordered in suitable doses. It seems preferable, however, to prescribe turpentine in a preparation containing a little alcohol, *e.g.*:

℞ Terebinthinæ laricis (N.F.) 10 c.c. (f3iiss);
Spiritus vini vitis 20 c.c. (f3v);
Syrupi adianti,
Syrupi tolu āā 75 c.c. (f3iiss).
M. Sig.: Three tablespoonfuls in 24 hours.

Terpin hydrate, along with sodium benzoate and thiocol, is, to my mind, the most valuable remedy known for bronchial suppuration in the stage of decline. Following, by way of illustration, are a few formulas which are of proven value, in my estimation.

Pills:

℞ Codeinæ 0.01 gram (gr. ¼);
Sodii benzoatis,
Terpini hydratis āā 0.1 gram (gr. iss);
Mellis q. s.
Ft. pil. No. i. Da tal. No. lx.
Sig.: Four to six pills daily between meals.

Cachets:

℞ Terpini hydratis,
Pulveris ipecacuanhæ et opii āā 0.25 gram (gr. iv);
Sodii benzoatis 0.5 gram (gr. viiss).
Pone in cachet. No. i. Da tal. No. xxx.
Sig.: Three cachets a day between meals.

Liquid preparations:

℞ Terpini hydratis	3	grams (gr. xlv);
Tincturæ aconiti	2.5	c.c. (℥xl);
Glycerini	45	c.c. (f℥iiss);
Aquæ aurantii florum	2	c.c. (f℥ss);
Alcoholis	25	c.c. (f℥vj);
Syrupi tolu	70	c.c. (f℥iiss).

M. Sig.: Three tablespoonfuls in the 24 hours.

℞ Terpini hydratis	10	grams (℥iiss);
Alcoholis	q. s.	ad solv.
Tincturæ vanillæ (N. F.)	5	c.c. (℥lxxx);
Tincturæ cacao	10	c.c. (f℥iiss);
Alcoholis	30	c.c. (f℥j);
Glycerini	200	c.c. (f℥viss);
Syrupi adianti,		
Syrupi tolu	āā 180	c.c. (f℥vj).

M. Sig.: One fluidounce two to four times in the 24 hours, before meals.

A number of other balsamic drugs, such as terpinol, eucalyptol, gomenol, etc., may likewise be used; as we shall see, creosote and its derivatives, guaiacol and thiocol, may be combined with them under certain circumstances. Further reference to this will be made in the section on chronic bronchitis.

Generally the balsamic remedies already enumerated are sufficient in the internal treatment in this stage. If, however, the bronchitis seems more persistent and shows a tendency to pass into a chronic state, it is well to resort without delay to *sulphur* preparations, with or without the balsamic medication, in one of the forms given below. The practitioner should first of all make sure, however, that the persistence of the bronchitis is not the result either of heart disease, kidney disease or tuberculosis, these conditions being at last relative contraindications to sulphur medication.

The manner in which the sulphur waters are taken internally and used for inhalations will be dealt with under chronic bronchitis. In dragging cases of acute bronchitis in which the treatment is being carried out at home, the sulphur treatment is usually limited to the use of some artificial sulphurous preparation or of a natural sulphur water. Thus, one of the natural sulphur waters may be taken in a dose of 50 to 100 c.c. with the addition of an equal volume of hot and sweetened milk, in the morning on awakening or in the afternoon.

Artificial sulphur water:

℞ Sodii monosulphidi cristallisati	0.2	gram (gr. iij);
Sodii chloridi	0.12	gram (gr. ij);
Sodii silicatis	0.1	gram (gr. iss);
Aquæ bulliatæ	1	liter (Oij).

M. Sig.: 150 to 200 c.c. (5 to 7 ounces) in the morning on an empty stomach, mixed with an equal volume of hot milk.

Artificial sulphur powder:

℞ Pulveris sodii sulphatis exsiccati	1 gram (gr. xv);
Pulveris calcii sulphidi	4 grams (ʒj);
Pulveris sodii subcarbonatis	6 grams (ʒiiss).

Tere bene simul et div. in chart. No. lxxv.

Sig.: One powder in a cupful of hot milk in the morning on an empty stomach and before retiring. Gargle with one-half of the mixture and swallow the other half.

The *chest rubs* of the preceding stage and the measures relating to the *nasopharynx* should be continued.

The patient should go out and resume his customary occupations gradually, but must continue to shun smoke, dust and other irritants and adhere to the general hygienic regulations to be set forth later in connection with the prophylaxis of acute bronchitis.

* * *

It is to be borne in mind that a correctly treated simple acute bronchitis should *always* be recovered from. If it fails to yield to treatment, one must necessarily be led to think of some more refractory pathogenic cause and make a special examination of the patient for tuberculosis, heart disease, uremia, whooping-cough, typhoid fever, etc.

* * *

Condensing the treatment of acute bronchitis in the **stage of decline**, we may draw up the following **outline of instructions**:

I.—INTERNAL MEASURES.

1. ℞ Terpini hydratis	3	grams (gr. xlv);
Tincturæ aconiti	1.25	c.c. (ʒjxx);
Sodii benzoatis	3	grams (gr. xlv);
Glycerini	45	c.c. (fʒiiss);
Aquæ aurantii florum	2	c.c. (fʒss);
Alcoholis	25	c.c. (fʒvj);
Syrupi tolu	70	c.c. (fʒiiss).

M. Sig.: Three tablespoonfuls in the 24 hours (prescription for three days).

2. If the bronchitis drags on after one week of the foregoing medication, there should be combined with it the ingestion of 100 c.c. ($3\frac{1}{3}$ ounces) of a natural sulphur water in the morning on an empty stomach, mixed with an equal volume of hot milk.

II.—EXTERNAL MEASURES.

1. Continue the *chest rubs*.
2. Continue the measures relating to the nasopharynx as employed in the preceding stage.

III.—GENERAL HYGIENIC MEASURES.

1. Resume outdoor activities gradually.
2. Get as much fresh air as possible, in particular air free of smoke and dust.
3. Avoid exposure, abrupt changes from heat to cold, and draughts. See that the feet are kept warm.

* * *

Even after due recovery from *bronchitis* has occurred, some subjects retain a considerable degree of bronchial sensitiveness and are extremely liable to "take cold" again. In this event, a careful inquiry should be made as to whether this predisposition to further trouble is not—as is often the case—dependent upon an obstinate nasopharyngitis, some definite diathetic state, local impairment of bronchial resisting power (emphysema), a latent tuberculous infection, etc.; any such underlying cause should receive careful treatment.

A prophylactic system of hygiene should be instituted, the main features of which are these:

1. *Shun dust as much as possible* and, if compelled to be in a dusty place, breathe exclusively through the nose and talk as little as possible.
2. *Shun the ordinary causes of broncholaryngeal irritation, viz.,* smoke, high winds, sudden changes of temperature, draughts, the breathing of cold air, and the use of alcohol and spices.
3. A special study should be made of the *clothing*, to obviate excessive perspiration and insure relative dryness of the skin (wearing of flannel, woolen tissues, etc.). It should be kept in mind that one takes cold rather through the skin than through the mouth.

The patient should neither undress nor sleep in a cold room.

4. Measures should be taken to harden the system and increase its powers to resist cold and infection by *systematic training*, chiefly in the line of *hydrotherapy* and *open air treatment*.

Hydrotherapeutic hardening treatment should consist chiefly of morning sponge baths or rain douches of progressively lowered temperature and, during the warm season, of cold baths in the open air in the river or ocean, of carefully regulated duration. Later, even Scotch douches may be resorted to, in favorable cases, to enhance the resistance of the organism to abrupt changes of temperature.

Open air hardening treatment consists in getting the patient accustomed to having the windows open and in actual open air cures at the sea-side, in the mountains or even merely in the country during the warm season.

5. *Daily systematic hygiene of the nasopharynx* is in order, and is even more necessary during periods in which a head cold is threatening to extend down to the bronchi.

6. In *recurrent bronchitis*, the mineral springs are frequently very beneficial.

If the patient is of the lymphatic rather than the congestive type and almost or quite free of digestive disturbance, the sulphur waters will be well suited for him.

Neuro-arthritic congestive cases, herpetic congestive cases without depression, and weakened gouty cases likewise, each have their special indications as regards the mineral springs.

7. Lastly, it should be noted that sometimes, in certain individuals, the preventive use of the balsamic remedies, *e.g.*, capsules of turpentine, during periods of threatening congestion of the pharynx and trachea, proves successful in overcoming the bronchitic process.

CAPILLARY BRONCHITIS AND BRONCHOPNEUMONIA.

In these conditions the two chief therapeutic indications are:

1. *Bronchopulmonary decongestion.*
2. *Neurocardiac stimulation.*

There obtain also the *indications common to all infections of the bronchi*:

3. Combatting the local infection of the pharynx and bronchi.
4. Combatting the general infection.

* * *

I.—**Decongestion of the bronchi and lungs** is promoted by:

1. *Dry cupping*, repeated morning and evening, or *wet cupping* if cyanosis is marked.

2. *Mustard poulticing*, repeated morning and evening.

For the severe cases the following measures are to be preferred:

3. *General moist wrapping* instituted thus: The patient is completely wrapped (except for the head and lower portions of the legs) in a sheet previously dipped in cold water (15 to 20° C.—59 to 68° F.) and well wrung out. A woolen blanket is wrapped about the sheet. This procedure is repeated two or three times if need be within fifteen to thirty minutes, in accordance with the effect obtained, and the maneuver as a whole is repeated two or three times in the 24 hours.

Properly carried out, this measure produces a decongestive effect on the deeper parts and also acts as a neurocardiac stimulant and to an appreciable degree as an antipyretic.

4. *Tepid baths* (30 to 32° C.—86 to 89.6° F.) of five to eight minutes' duration, with cold affusion to the head and back of the neck during the bath. At the same time the patient should be rubbed with the hands and a few swallows of some hot stimulating infusion administered. After the bath, the patient is dried and wrapped in a woolen blanket. Generally it is unnecessary, and frequently even prejudicial, to administer more than two baths in 24 hours. Furthermore, the number, duration and temperature of the baths should be modified according to the patient's reaction, the course of the disease, and the intensity and persistence of the fever. As a rule, the effects of these baths is very distinct and readily observed by the associates or attendants. In favorable cases, the breathing becomes slower, deeper and easier, and cyanosis disappears; a return to the packs described above may then be made. In the contrary event, one should proceed to the measures next to be described, which are more active.

Warm baths (38 to 40° C.—100.4 to 104° F.) are sometimes capable of rendering service in cases with very widespread congestion; they often bring very perceptible relief to the lesser circulation.

In children, Jules Renault, of Paris, gives preference to a bath at 38° C. (100.4° F.) of eight minutes' duration and repeated every three hours day and night. The bath at this temperature is revulsive, while a bath at 36° or 35° (96.8 or 95° F.) is cooling and sedative.

If the patient's temperature exceeds 40° C. (104° F.), the bath should be given at a temperature of 36 or 35° C. If the child is too depressed, a wet pack at 38° C. (100.4° F.) for two hours should alone be used.

Cold baths (28 to 20° C.—82.4 to 68° F.) for a period of five to ten minutes have been recommended by Labadie-Lagrave and Hutinel in cases in which very pronounced general manifestations (fever, dyspnea, restlessness) are combined with local lesions of small extent and a robust heart. After the bath the child is quickly rolled in a hot blanket and warmed up with a glass of hot milk or a small amount of an alcoholic preparation. Such baths are contraindicated in the opposite type of case in which the lesions are extensive, the febrile reaction slight or intermediate and the heart weak. They are often poorly borne. If one desires to resort to them, in particular in cases of hyperpyrexia, it is well to begin with a temperature of 30° C. (82.4° F.), then gradually lower it to 25 or 20° C. (77 or 68° F.) by addition of cold water.

5. *Mustard bath*: Such a bath should be prepared at 32 to 35° C. (89.6 to 95° F.). A sac of fabric containing 200 to 300 grams (6½ to 10 ounces) of mustard flour, previously moistened in cold water, is then immersed in the water. The following procedure is to be preferred to it.

6. *General mustard pack*.—This is probably, at the present time, the most powerful revulsive measure available for combating cyanosis, hyperdyspnea, asphyxia and adynamia. The technic is as follows: One-half kilogram (1 pound, or 3 handfuls) of mustard flour is moistened in 1 liter (quart) of water at 40° C. (104° F.) until a strong mustard odor is set free. A sheet about 3½ times as broad as the patient is dipped into it, allowed to dry slightly and spread over a large woolen blanket. The patient lies on the moist sheet and is wrapped up in it completely, including the arms and legs, with the exception of the head; the woolen blanket is then wrapped around it. The pack is continued for twenty to thirty minutes, until the circulation and respiration improve and the skin is of an actual "broiled lobster" color. The patient is then placed in a tepid cleansing bath or washed with tepid water and placed in an ordinary moist pack for an hour, during which time he is given hot stimulating drinks, to promote perspiration.

The favorable effect is manifested in the disappearance of cyanosis, reduction of dyspnea, substitution of coarse moist râles for the fine crepitant and subcrepitant varieties, restoration of proper amplitude of the pulse and attenuation of the adynamia. In such an event, the use of the tepid baths previously described may be resumed. In the opposite event, the packs should be repeated on the succeeding days, once or twice a day. I am in the habit of employing mainly the mustard chest packs, similar to the above measure but limited to the chest.

In a robust adult, and *a fortiori* in the full-blooded plethoric type of subject, it would be rational to apply repeated wet cups or even to withdraw 200 to 400 cubic centimeters (7 to 14 ounces) of blood by venesection. An emetic, to remove obstructing material, might also be of service in such cases.

* * *

II.—The second indication, **neuro-cardio-bronchial stimulation**, which is an important feature in a disorder in which the circulatory system, and especially the lesser circulation, is so seriously disturbed and in which the heart participates so directly in the battle, is already

partly met by the physical, and particularly the hydrotherapeutic measures (moist wrappings, baths, mustard packs and baths); these measures possess, indeed, the uncommon advantage of being at the same time decongestive, stimulant and antipyretic.

It may, however, be advisable to prescribe neurocardiac stimulants, chief among which should be mentioned strychnine, digitalis, sparteine, camphor in oil, alcohol and cinchona. (See Part I: *Medicinal Agents*, and Part IV: *Treatment of Circulatory Disorders*.)

Strychnine is especially indicated, as its neurocardiac tonic action is rather marked; it tends, furthermore, to reawaken the reflex contractility of the bronchi and, in consequence, to antagonize the dangerous paresis of the bronchi in these cases.

Following are a few typical liquid preparations embodying the drugs above referred to:

Preparations for an adult:

℞ Strychninæ sulphatis	0.01-0.03	gram (gr. $\frac{1}{6}$ - $\frac{1}{2}$);
Sparteinae sulphatis	0.3	gram (gr. v);
Extracti cinchonæ	15	grams (℥ss);
Spiritus vini vitis	40	c.c. (f℥x);
Glycerini	q. s. ad 100	c.c. (f℥iiss).

M. Sig.: Four teaspoonfuls in the 24 hours in an aqueous vehicle (coffee, infusion, wine).

℞ Strychninæ sulphatis	0.006-0.01	gram (gr. $\frac{1}{40}$ - $\frac{1}{6}$);
Tincturæ digitalis	6	c.c. (f℥iiss);
Spiritus frumenti	36	c.c. (f℥ix);
Syrupi	20	c.c. (f℥v);
Tincturæ cinnamomi (N. F.)	4	c.c. (f℥j);
Aquæ destillatæ	60	c.c. (f℥ij).

M. Sig.: Three tablespoonfuls in the 24 hours.

If required in addition, hypodermic injections of 10 per cent. *camphor in oil* (1 to 4 c.c.—15 to 60 minims), of sparteine sulphate (0.05 to 0.1 gram— $\frac{3}{4}$ to $1\frac{1}{2}$ grains) or of strychnine sulphate (0.002 to 0.004 gram— $\frac{1}{30}$ to $\frac{1}{15}$ grain—or more) may be administered.

For example:

℞ Strychninæ sulphatis	0.01	gram (gr. $\frac{1}{6}$);
Sparteinae sulphatis	0.2	gram (gr. iij);
Aquæ destillatæ	q. s. ad 10	c.c. (f℥iiss).

M. Sig.: Two to four cubic centimeters (30 to 60 minims) in 24 hours (hypodermically).

In bronchopneumonia in children, Delcourt administers intramuscular injections of *ether*, giving 0.5 cubic centimeter (8 minims) three or four times a day.

The giving of physiologic salt solution with caffeine has also been advised. But neither salt solution nor caffeine appears worthy of recommendation—the former because in the presence of chloride

retention, which is rather common, it may increase the already threatening pulmonary edema, and the latter, because it acts rather as an excitant than a tonic, and excitement and restlessness are often already present to a marked degree.

One point is deserving of emphasis in relation to the feasibility of the internal administration of certain remedies. In the hyperemic stage and throughout the periods in which the capillary bronchi are obstructed, the use of the balsamic drugs (with the possible exception of tolu), and *a fortiori* of the sulphur compounds and iodides, is altogether contraindicated, precisely on account of their own congesting action. It is therefore well to rule out turpentine, terpin hydrate, oil of santal, etc., from prescriptions for suffocative catarrh. At the most, as already pointed out, one may resort to the weak expectorants (sodium benzoate, sulphurated antimony, etc.).

Considerable care should even be exercised in the use of sedatives, especially aconite and the opiates, which are capable of interfering with the process of unblocking expectoration. In the presence of paroxysmal, fatiguing and harassing cough, however, it is justifiable to prescribe a sedative combination such as the following:

℞ Antipyrinæ,	
Sodii benzoatis	āā 3 grams (gr. xlv);
Syrupi codeinæ (N. F. IV)	30 c.c. (fʒi);
Syrupi tolu	60 c.c. (fʒij).

M. Sig.: Three tablespoonfuls in 24 hours (prescription for two days).

Oxygen inhalation in large dosage is very useful. The patient should breathe oxygen through a funnel for five minutes every quarter hour. With oxygen tanks fitted with a micrometer screw, he may thus be made to inhale 800 to 1000 liters of oxygen in twenty-four hours; the only drawback is the cost of the oxygen.

The pneumo-oxygenator of Lian and Navarre can also be employed for intensive inhalation. This method can be combined with subcutaneous injection of oxygen into the thigh or in the hypogastric region with the devices of Bayeux, Lesieur, Fourcade, and Lian and Navarre (hypodermo-oxygenator, etc.).

III.—Local disinfection of the pharynx and bronchi presents no special feature in these cases. The external procedures, *viz.*, vaporizations, fumigations, disinfection of the nasopharynx by sprays and inhalations (when possible), and instillations may be carried out in all respects as already described at length under acute bronchitis. In children it may be more convenient to use Richardson's atomizer (Fig. 301) for spraying solutions into the nose and Marfan's syringe (Fig. 302) for nasal injections of resorcinol in oil.

IV.—As for the general treatment against infection, mention will be made only of three agents—the first used since a long time, but of problematic value, *viz.*, *quinine*; the second often yielding striking results in cases which, unfortunately, can hardly be selected in advance, *viz.*, *collargol* (see Part I); the third, more recent, the *vaccine* of André Dufourt, of Lyon, which gives good results in bronchopneumonia in children.

Colloidal silver may be employed by inunction:

℞ Collargol	15 grams (3ss);
Adipis lanæ hydrosi	35 grams (3ix);
Adipis benzoinati	50 grams (3xiiij).

M. Sig.: For external use.

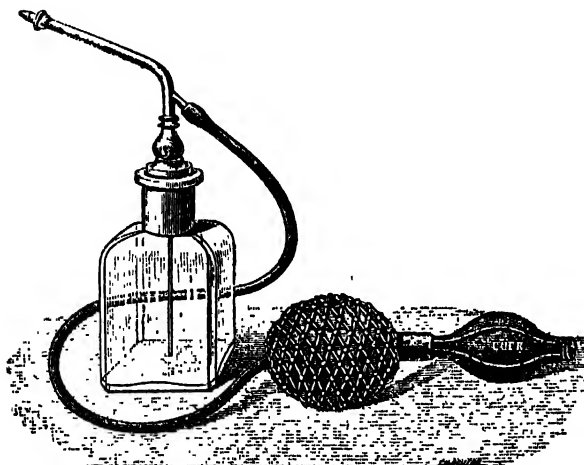


Fig. 301.—Richardson's atomizer.



Fig. 302.—Marfan's nasal syringe.

Instead of the above, 15 per cent. collargol ointment to the amount of 3 grams (45 grains) may be rubbed in from one to three times a day according to indications.

It is well to recall that, to obtain results from such inunctions:

1. The product used must be of good quality.
2. The site of inunction must be prepared by washing with soap and water, followed by alcohol.
3. The process of inunction must be kept up for a sufficient length of time (twenty to thirty minutes).
4. The ointment must then remain in contact for several hours beneath a cotton dressing.

Many of the failures are probably due merely to improper technic.

For greater certainty, *subcutaneous*, *intravenous* or *intramuscular injections* may be used. For this purpose, ampules of 5 or 10 cubic centimeters of colloidal silver, electrically prepared, in sterile, isotonic and

stable solutions, should preferably be ordered. From 5 to 10 cubic centimeters ($1\frac{1}{4}$ to $2\frac{1}{2}$ fluidrams) should be injected on the first day and the amount increased by 5 cubic centimeters on the succeeding days if the initial injection has not proven effective. Intravenous injections, unfortunately, cause unduly severe febrile reactions.

Dufourt's *vaccine* gives such striking results in bronchopneumonia in children that it should be injected without hesitation.

* * *

The instructions to be given as to *general hygiene*, fresh air and room temperature are in all respects the same as those already set forth in connection with bronchitis.

During the acute febrile period, the *diet* should be exclusively liquid and of a stimulating character, being made up of milk and milk preparations, light broths (vegetable and chicken), cereal decoctions, meat juice, liquid creamy articles, clear purées, weak alcoholic preparations, black coffee, fruit jelly, orangeade or lemonade, hot aromatic infusions, etc., divided into small meals taken at three-hour intervals.

* * *

Given an adult exhibiting evidences of **capillary bronchitis** or **bronchopneumonia** following a diffuse bronchitis, the following **outline of instructions** is obtained on the basis of the foregoing data:

I.—EXTERNAL MEASURES.

1. *Morning and evening: Moist wrappings of the chest or entire body*, carried out with a Turkish towel or sheet dipped in water at room temperature, well wrung out and wrapped around the chest or entire body (except the head and feet), covered over with a woolen blanket, and renewed, according to the effect obtained, two or three times in the course of a half hour.

In the presence of hyperpyrexia or patent inadequacy of the foregoing procedure, tepid baths (30 to 32° C.— 86 to 89.6° F.) of five to eight minutes' duration, with cold affusions to the head and back of the neck *during the bath*; *after the bath*, the patient is dried and wrapped in a woolen blanket.

2. *Morning and evening*, after the moist wrappings or bath, inunction for twenty to thirty minutes with 3 grams (45 grains) of 15 per cent. colloidal silver ointment.

3. *Inhalations, gargling and mouth washing* every three or four hours with hot boiled water to which has been added one teaspoonful of:

℞ Tincturæ benzoini 5 c.c. (℥ lxxx);
 Alcoholis 100 c.c. (fʒiiss).

M. Sig.: For external use.

4. Then apply in the nostrils:

℞ Resorcinolis 1 gram (gr. xv);
 Olei cinnamomi 1 c.c. (℥ xv);
 Petrolati liquidi 60 c.c. (fʒij).

M. Sig.: For external use.

II.—INTERNAL MEASURES.

1. Three times a day (7 a.m., 2 and 7 p.m.) give, along with a small amount of an alcoholic preparation, *one teaspoonful* of the following combination:

℞ Strychninæ sulphatis 0.02 gram (gr. ⅓);
 Sparteinæ sulphatis 0.3 gram (gr. v);
 Extracti cinchonæ 15 grams (ʒss);
 Spiritus vini vitis 40 c.c. (fʒx);
 Glycerini q. s. ad 100 c.c. (fʒiiss).

2. In the event of exhausting cough: At 10 a.m., 4 p.m., and once during the night, give a *tablespoonful* of the following syrup:

℞ Antipyrinæ,
 Sodii benzoatis āā 3 grams ((gr. xlv);
 Syrupi codeinæ (N. F. IV) 30 c.c. (fʒj);
 Syrupi tolu 60 cc. (fʒij).—M.

3. Every two or three hours, ingestion of a small amount of milk, coffee with milk, tea with milk, black coffee, a mild alcoholic stimulant, or a hot infusion.

III.—GENERAL HYGIENIC MEASURES.

1. Room temperature: 18° C. (65° F.).

As much ventilation as possible.

To be carefully avoided: Smoke, dust, draughts, and exposure during changes of clothing.

Talking to be restricted as much as possible.

No visitors.

2. Water containing eucalyptus leaves to be vaporized in the room and oil of turpentine on cloths placed around the patient's bed.

BRONCHOPNEUMONIA.

From the standpoint of clinical therapeutics, bronchopneumonia practically merges with capillary bronchitis.

The dangers that threaten are the same, *viz.*, *asphyxia* and (neurocardiac) *asthenia*, and the forms generally described, *viz.*, the *asphyxial*

or congestive form, the cardioplegic form, the nervous form, the asthenic or adynamic form, etc., constitute sufficient evidence of this.

SECONDARY ACUTE BRONCHITIS.

As secondary forms of acute bronchitis, dependent upon some well-defined general infection, reference will here be made only to the *bronchitis* of *influenza*, *typhoid fever*, *measles* and *diphtheria*, which, since they generally exhibit certain especial features and entail certain specific indications, are deserving of separate consideration.

For the general treatment of acute localized, diffuse or capillary bronchitis the reader is referred to the preceding sections.

INFLUENZAL BRONCHITIS.

For the initial *naso-pharyngo-laryngeal catarrh*, the following may be prescribed:

℞ Mentholis,
 Phenylis salicylatisāā 4 grams (3j);
 Alcoholis 120 c.c. (f3iv);
 Olei illicii anisati,
 [vel Anetholis (N. F.)] grt. xx.

M. Sig.: One teaspoonful in one-third tumblerful of very hot water for *inhalation* and *gargling* four times a day.

No special form of apparatus seems necessary in this connection. The patient simply folds a towel in the form of a funnel and inhales directly and freely through the nose and mouth the steam emanating from the foregoing mixture. As the latter is slightly irritating, it may make him cough; he should be warned of this. When the mixture has cooled to a lukewarm temperature, he should use it as a mouth wash and gargle persistently with it. Gargling has been belittled, but when properly carried out and repeated with a mouthful of fluid it exerts a mechanical cleansing action on the tonsillar fossæ, induces spasmodic contractions of the muscles of the pharynx and an increase of nasal and pharyngeal secretions which, aside from any specific effect of the fluid used as gargle, result in a most useful cleansing of the nasal cavities and pharynx. When he has finished gargling, the patient should blow his nose in a systematic manner, occluding one nostril at a time and blowing out through the other. After these maneuvers relating to the nose and pharynx have been concluded—ten minutes are required for their proper execution—the patient should apply carefully to his nostrils some *borated*, *sulphurated*, *mentholated*, *camphorated* or *resorcinolated vaselin*, expressed from a tube the nozzle of which has, for added safety, been passed through an open flame, and may then enjoy a well-earned rest, sucking some

chlorate, peroxide, or simply acidulated lozenges, which will act mainly by promoting almost continuous salivation and swallowing movements.

By the second or third day the disease process will have extended to the bronchi. Bronchitis being present, the patient coughs, blows his nose, expectorates, and his chest is filled with more or less coarse rhonchi, frequently more abundant at the bases.

* * *

For the bronchitis in this stage—it progresses very rapidly in influenza—counterirritation, expectorants and stimulants are indicated. One may prescribe, for example:

R Ammonii acetatis,
 Sodii benzoatisāā 4 grams (3j);
 Spiritus vini vitis 20 c.c. (f3v);
 Syrupi codeinæ (N. F. IV),
 Syrupi terebinthinæ (10 per cent.),
 Syrupi toluāā 45 c.c. (f3iss).
 M. Sig.: Five tablespoonfuls in the 24 hours, *i.e.*, one about every three hours; patient *not* to be awakened.

The above mixture is alike sedative by virtue of the codeine, stimulant by virtue of the ammonium acetate, diaphoretic because of the alcohol and the ammonium acetate, and expectorant and diuretic because of the sodium benzoate, the ammonium acetate, the turpentine and tolu. It should be consumed in the course of two days.

A pronounced revulsive effect by the *free application of cups* is also indicated in this early stage, and the pulmonary vasoconstrictor reflexes should be called forth by repeated stimulation of the skin surface, as by repeated application of *mustard plasters* or *mustard poultices*.

The feature which more especially characterizes influenzal bronchitis, however, is the tendency to weakness of the bronchial walls or *broncho-plegia*.

In the *bronchoplegic form* of influenza, the smooth muscle of the bronchi is affected from the start, sometimes in the absence of fever, and without premonitory phenomena. There is present, as it were, a bronchoplegic syndrome in its pure form. The dominant symptom is difficulty of breathing, gradual, progressive dyspnea, without any appreciable bronchitis being revealed at the beginning by auscultation. Then secretion sets in, and by virtue of the complete lack of bronchial power, the cough is powerless to expel the accumulating secretions; there are then witnessed filling of the bronchi, increasing difficulty of oxygenation, and progressive asphyxia, unless some complication supervenes to shorten the process.

Again, in influenza there are *vago-paralytic congestions* of interminable duration, when, indeed, these do not result fatally. There exists an atony or collapse throughout the pulmonary system by reason of the loss of bronchial contractility and diminution of elasticity of the air-vesicles (see *Congestion of the Lungs*).

The practical conclusion to be drawn from this is as follows: *In any case of acute influenzal bronchitis (and, it may and should be said, in any form of acute bronchitis), the attendant should think of bronchoplegia and combat it: 1. When the dyspnea, in the absence of any heart lesion, is disproportionate to the auscultatory phenomena. 2. When bronchial obstruction is rapidly increasing. 3. When the bronchitis, persistent and refractory to treatment, is becoming subacute and threatens to pass into a chronic state.*

In these cases we should not consider that we have done our conscientious duty by prescribing an ordinary sedative syrup, however correctly formulated. The bronchi have less need of sedation than of stimulation. Here, opium, ordinarily a marvellous remedy, becomes a dangerous weapon; we should be on guard against the misleading quiescence which it procures, the asphyxia meanwhile stealthily proceeding and progressing. While relief from cough is always indicated, here it should be at the most moderated. One should chiefly endeavor to render the cough infrequent, but effective, deobstruent and expulsive; therein lies salvation. How shall this be done? By stimulating the nervous system, by reawakening bronchial contractility, and in this connection therapeutics provides us with two powerful and proven weapons, *viz.*, *ergot* and *strychnine*, together with which may be grouped *moist wrappings* and *mustard packs*.

Thus, one may prescribe:

℞ Strychninæ sulphatis 0.001 gram (gr. $\frac{1}{65}$);
 Extracti ergotæ aquosi (N. F.) 0.05 gram (gr. $\frac{3}{4}$);
 Quininæ sulphatis 0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. x.

Sig.: Two to four pills in 24 hours, with a small amount of alcoholic stimulant. (In cases where the bronchial asthenia is more marked and persistent, five, six or more pills a day may be given.)

Or:

℞ Strychninæ sulphatis 0.0005-0.001 gram ($\frac{1}{30}$ - $\frac{1}{65}$ grain);
 Extracti ergotæ aquosi (N. F.),
 Sodii benzoatis,
 Terpinæ hydratis,
 Quininæ sulphatis 0.05 gram (gr. $\frac{3}{4}$).

Ft. pil. No. i. Da tal. No. xl.

Sig.: Four to eight pills in 24 hours, according to the reaction and tolerance.

℞ Strychninae sulphatis 0.005-0.01 gram (gr. $\frac{1}{12}$ - $\frac{1}{6}$);
 Sodii benzoatis,
 Ammonii acetatis āā 4 grams (3j);
 Spiritus vini vitis 20 c.c. (f3v);
 Syrupi codeinae (N. F. IV),
 Syrupi terebinthinae (10 per cent.),
 Syrupi tolu āā 45 c.c. (f3iss).

M. Sig.: Five tablespoonfuls in 24 hours, *i.e.*, one about every three hours; patient *not* to be wakened.

Finally, if the bronchitis assumes the capillary type and tends toward bronchopneumonia, the treatment previously described should be instituted (see *Capillary Bronchitis*).

* * *

Thus, in the presence of an **influenzal bronchitis in an adult, with a tendency to bronchoplegia**, one should prescribe:

I.—EXTERNAL MEASURES.

1. Moist wrappings about the chest two or three times in the twenty-four hours, by means of cloths dipped in water at 18 to 22° C. (64.4 to 71.6° F.), renewed twice in twenty minutes, with a woolen blanket as an outer covering.

2. *Inhalations* and *gargling* with a solution of menthol in alcohol, followed by the application of an ointment of resorcinol to the nostrils.

3. *Inunctions* of 15 per cent. *collargol ointment*.

II.—INTERNAL MEASURES.

℞ Strychninae sulphatis 0.0005-0.001 gram (gr. $\frac{1}{30}$ - $\frac{1}{65}$);
 Extracti ergotae aquosi (N. F.),
 Sodii benzoatis,
 Terpini hydratis,
 Quininae sulphatis āā 0.05 gram (gr. $\frac{3}{4}$).

Ft. pil. No. i. Da tal. No. xl.

Sig.: Four to six pills a day with a half-cupful of an infusion of pectoral species, sweetened with syrup of tolu and with addition of one teaspoonful of brandy.

III.—GENERAL HYGIENIC MEASURES.

See *Acute Bronchitis*.

* * *

TYPHOID FEVER.—The frequency of bronchial congestion at all stages of typhoid fever is well known. It is very often accompanied by various forms of pulmonary hyperemia to which further reference will be made in a later section (see *Congestion of the Lungs*).

There are two significant features relating to its treatment:

1. The *congestion* generally predominates over the catarrhal condition, so that thoracic revulsive measures (cupping and packs) are

particularly indicated, while the healing and congesting balsamic remedies of the type of turpentine are, as a rule, contraindicated.

2. As in influenza, *cardiobronchial asthenia is to be feared*; cardiac and bronchial stimulants are therefore indicated, and especially baths, which are doubly useful for antagonizing general infection and for neurocardiac stimulation.

As a rule, then, the treatment should comprise:

1. Treatment by baths, for its usual indications.
2. Cupping or chest packs.
3. If required, a neurocardiac stimulant and expectorant preparation based, *e.g.*, on strychnine, sparteine and sodium benzoate.

* * *

BRONCHIAL AMEBIASIS.—Cases have been reported of bronchial amebiasis characterized by *bloody* expectoration and containing amebæ and cysts. The treatment consists of injections of emetine hydrochloride, which are very effective.

* * *

BRONCHITIS IN MEASLES.—Bronchitis occurs so often in measles that there has been reason to consider it an ordinary symptom of the disease. It is a fact that the mucous membrane of the respiratory passages is always involved in the morbillous exanthem.

Oculonasal catarrh is a constant accompaniment, and its great contagious property is well known. *Bronchitis involving the large bronchi* is very frequent; it may, and as a matter of fact readily does, especially in children, pass into a *capillary bronchitis* or suffocative catarrh and into a *bronchopneumonia* entailing a very grave prognosis.

The initial *oculonasal catarrh* should, therefore, receive careful treatment.

1. *Disinfection of the nasal passages* should be carried out as already described.

2. *Disinfection of the mouth and pharynx* should be procured by *lavage* carried out with a fountain syringe or Weber's syphon. As irrigating fluid one may use either plain boiled water, or water containing one tablespoonful of Labarraque's solution to the liter, or water containing one dessertspoonful of sodium bicarbonate to the liter. The amount to be used is $\frac{1}{2}$ to 1 liter two to four times a day.

3. Disinfection of the skin, and more particularly of the hands, by careful washing with soap and warm water followed by alcohol (eau de Cologne).

4. Finally, it is well to institute various forms of *vaporization* in the room (water, eucalyptus, turpentine, etc.).

If, in spite of these curative and preventive measures, *the infection extends to the bronchi*, becoming manifest in whistling and subcrepitant râles and slight dyspnea, the chief aims should be:

1. To allay the cough, which is often paroxysmal and incessant.
2. To prevent extension to the bronchioles.

These objects may be attained:

1. By the systematic use of *chest packs* or *warming compresses*, thus:

Fold a piece of muslin in 16 or 20 layers so as to obtain a band sufficiently long to go around the chest at least $1\frac{1}{2}$ times and sufficiently broad to reach from the iliac crests to the axillæ. Moisten it with water at 25 to 28° C. (77 to 82.4° F.), pass it around the body, cover it with oiled silk and cotton, and hold it in place with a flannel belt. According to indications, it should be renewed every half hour (refrigerant effect) or every two or three hours (sedative, decongestive effect).

2. By the administration of a *stimulant, expectorant, diaphoretic, but non-congesting mixture*. As the chief risk is blocking of the bronchial tubes, one should be very sparing in the use of sedatives, and especially of the opiates. Following is a typical mixture for these cases:

℞ Ipecacuanhæ pulveris	0.2	gram	(gr. iij);
Ammonii acetatis	4	grams	(5j);
Sodii benzoatis	2	grams	(3ss);
Spiritus vini vitis	20	c.c.	(f3v);
Syrupi tolu	30	c.c.	(f3j);
Syrupi acaciæ	10	c.c.	(f3iiss);
Aquæ destillatæ	50	c.c.	(f3ij).

M. Sig.: One dessertspoonful every two or three hours for a child of four years.

3. The procedures already mentioned relating to *antisepsis of the nasal tract, mouth and pharynx* should be continued.

* * *

If, in spite of this treatment, *capillary bronchitis* or *bronchopneumonia* develops, as will be noted from a more or less abrupt rise of temperature, dyspnea of varying degree but always marked, and the usual auscultatory signs, the condition should be treated:

1. By *baths* combined with chest wrappings.
2. By *neurocardiac stimulant medication*, either by the following:

℞ Strychninæ sulphatis	0.001	gram	(gr. $\frac{1}{100}$);
Sparteïnæ sulphatis	0.03	gram	(gr. ss);
Ammonii acetatis	4	grams	(5j);
Spiritus vini vitis	30	c.c.	(f3j);
Syrupi coffeæ	40	c.c.	(f3x);
Syrupi aurantii	15	c.c.	(f3ss);
Aquæ destillatæ	60	c.c.	(f3ij).

M. Sig.: One dessertspoonful every two or three hours for a child of three to five years.

Or, by subcutaneous injections of 10 per cent. camphor in oil, of strychnine, 0.00025 gram ($\frac{1}{200}$ grain), or of caffeine, 0.05 gram ($\frac{3}{4}$ grain). Physiologic salt solution, with or without caffeine, may be dangerous, as chloride retention exists in many of these patients, and a saline injection may induce edema and increase the pulmonary difficulties.

3. By *anti-infectious medication*, consisting in inunctions or injections of a preparation of colloidal silver, which are particularly indicated in these cases.

SPECIAL FORMS OF ACUTE BRONCHITIS.

BRONCHITIS IN CHILDREN.—In view of the details presented in earlier sections, no prolonged consideration will here be required, and the description of the treatment will be practically limited to a number of typical therapeutic outlines adapted to the needs in the commoner types of cases met with among children.

I.—**Treatment of Simple Acute Bronchitis in a Child** (as described by P. Le Gendre: "*Thérapeutique Infantile*").

1. Rest in bed. Cotton wrappings around the legs.

2. Restricted liquid diet. In the first two years of life, one to three teaspoonfuls of brandy in the twenty-four hours, preferably given in the milk.

3. R Sodii benzoatis	1-4	grams (gr. xv-3j);
Syrupi opii (0.1 per cent.)	4-24	c.c. (f5i-vj);
Aquæ laurocerasi	3-6	c.c. (m lxxx-clx);
Tincturæ aconiti	gtt. ii-xx;	
Syrupi acaciæ	10-20	c.c. (f3iiss-v);
Aquæ destillatæ	50-100	c.c. (f3xiiss-xxv).—M.

NOTE.—The initial quantities given apply to children of two years, the mixture being given in teaspoonfuls, five or six a day. The other quantities apply to children of five years, the mixture being given in tablespoonfuls, three a day.

4. Mustard poultices *morning* and *evening*.

If the fever is high, *tepid baths* three or four times a day, or *cold moist wrappings* of the chest.

5. Free vaporizations of *eucalyptus*, *benzoin* or 4 per cent. *menthol* in *alcohol*, one teaspoonful in a liter of water.

6. Position of the child to be changed in the course of the day; he should lie for a time on his abdomen, then on his back, then on his side, then sit up, etc.

7. Instillation of 2 per cent. *resorcinol* in *glycerin* or *resorcinol* in *liquid petrolatum* into the nostrils.

II.—**Treatment of Established Capillary Bronchitis or Bronchopneumonia in a Child.**—1. Take the rectal temperature every three or four hours and give a bath at 30 to 34° C. (86 to 93° F.) or 28 to 30°

C. (82.4 to 86° F.) or even at a lower temperature, according to the reaction observed, and lasting eight to ten minutes, if the body temperature rises above 39° C. (102.2° F.).

During the bath, the child is to be given a swallow of some hot alcoholic stimulant or coffee. In the presence of cyanosis or marked dyspnea a *mustard bath* (see above) or a *mustard chest pack* should be given.

After the bath, the child is dried with a warm towel and rolled up in a woolen blanket.

2. R Ammonii acetatis 2 grams (3ss);
Spiritus vini vitis 30 c.c. (f3j);
Syrupi coffee 22.5 c.c. (f3vj).

M. Sig.: To be given in 24 hours in teaspoonful doses in a little hot infusion or orangeade.

3. *Morning and evening*, inunction for twenty minutes in the inguinal region, in the axilla or on the thorax with 0.33 gram (5 grains) of collargol in 2 grams (½ dram) of benzoinated lard. After each inunction the area is covered with ordinary cotton, suitably held.

4. Free vaporizations of *eucalyptus* and of tincture of benzoin.

5. Where there is a tendency to *adynamia*, injections of *camphor in oil* or of *strychnine*, 0.00025 to 0.0005 gram (½₆₀-1/30 grain), twice daily.

6. *A liquid but stimulating diet*, divided into small meals taken at regular intervals: Milk, milk preparations, meat juice, vegetables with flour, fruit jellies, coffee, champagne, small amounts of alcoholic beverages, orangeade or lemonade.

III.—Treatment of Infantile Bronchitis in the Stage of Convalescence (in a child suspected of harboring tuberculous infection).

1. R Olei limonis 10 c.c. (f3iiss);
Olei rosmarini,
Terebinthinae laricis āā 20 c.c. (f3v);
Styracis 4 c.c. (f3j);
Alcoholis 175 c.c. (f3vj).

M. Sig.: For daily rubs over the chest.

2. In the *morning*, before breakfast, alternately 30 cubic centimeters (1 fluidounce) of *codliver oil* (if tolerated) and a tablespoonful of:

- R Iodi 0.2 gram (gr. iij);
Acidi tannici 0.5 gram (gr. viiss);
Calcii phosphatis (dibasic) 2 grams (3ss);
Acidi lactici q. s.
Aquæ destillatæ 36 c.c. (f3x);
Sucrosi 64 grams (f3xvii).—M.

On alternate days, during the noon and evening meals, in the beverage used, one teaspoonful of the following combination:

- R Sodii monomethylarsenatis 0.5 gram (gr. viiss);
Extracti cinchonæ 10 grams (3iiss);
Spiritus vini vitis 40 c.c. (f3x);
Glycerini q. s. ad 100 c.c. (f3iiss).—M.

3. *Morning and evening*, in the open air, weather permitting, respiratory exercises in the following three forms:

Ten minutes: Reading out loud in measured rhythm.
 " " Rhythmic scales and singing.
 " " Rhythmic deep inspirations and expirations, following the metronome.

4. A prolonged stay in the *country, mountains* or at the *seashore*. Systematic open air life.

In children with restricted breathing capacity and narrow chests, treatment in the mountains is especially indicated. Cases with persistent weakness and anemia, with loose bronchitis and profuse expectoration, or with lymphatic tendencies and torpid bronchitis may be directed, when circumstances permit, to resorts especially adapted to such types of cases.

5. *Regular meals* and a *generous diet*, including, if need be, a little *raw meat juice*. It is well to place on the table, with the salt, some powdered calcium phosphate to be used concurrently with the sodium chloride for dusting over the food (especially soups and purées).

In conclusion, it may prove serviceable to recall the *approximate dosage* per year of age of the drugs most commonly used in the treatment of bronchitis in children:

Average serviceable *daily* amounts *per year of age*:

Strychnine sulphate	0.00025-0.0005	gram (gr. $\frac{1}{200}$ - $\frac{1}{130}$);
Tincture of aconite	2	drops;
Tincture of belladonna	3	drops;
Tincture of digitalis	2-4	drops;
Codeine	0.005	gram (gr. $\frac{1}{12}$);
Sodium benzoate	0.1	gram (gr. iss);
Terpin hydrate	0.1	gram (gr. iss);
Extract of cinchona	0.1	gram (gr. iss);
Ammonium acetate	0.25	gram (gr. iv);
Camphor in oil (10 per cent.)	1-2	c.c. (℥ xvi-xxxij);
Alcohol	10	c.c. (f3iiss);
Cherry-laurel water	0.25	c.c. (℥ iv).

BRONCHITIS IN OLD PERSONS.—Following are given, similarly, a few typical outlines of treatment for bronchitis in aged subjects, in whom pulmonary congestion and bronchial and cardiac paresis are particularly to be dreaded.

I.—Bronchial Catarrh of Long Standing with Congestion of the Bases in an Aged Woman.—**Symptoms.**—Copious purulent expectoration, especially in the morning, with some fibrinous sputum.

Sonorous and whistling râles over the whole length of the lungs, with incipient dulness and fine râles at the bases.

Slight, irregular fever; temperature 37 to 38° C. (98.6 to 100.4° F.) in the axilla.

Occasionally, slight attacks of heart failure (the area of congestion is extending).

To be treated:

A.—The bronchitis.

1. Inhalations, aromatic vaporizations, fresh air, etc.

2. \mathcal{R} Terpini hydratis 2 grams (3ss);
 Aquæ laurocerasi 10 c.c. (f3iiss);
 Alcoholis 25 c.c. (f3vj);
 Syrupi tolu 75 c.c. (f3iiss);
 Spiritus vini vitis q. s. ad 225 c.c. (f3viiss).

M. Sig.: Three tablespoonfuls in the 24 hours in a cup of hot infusion.

3. Repeated cupping or mustard applications over the lung bases.

B.—The yielding heart.

- \mathcal{R} Sparteinæ sulphatis,
 Ergotæ āā 0.05 gram (gr. $\frac{3}{4}$);
 Tolu q. s.

Ft. pil. No. i. Da tal. No. xx.

Sig.: Three pills a day.

II.—Acute Bronchitis with Heart Weakness in an Old Man, with Threatening Heart-Failure and Collapse.

1. About twenty *dry cups* once daily.

2. \mathcal{R} Solutionis digitalini cristallisati (1:1000;
 Codex) 1 c.c. (m xvj);
 Ammonii acetatis 8 grams (3ij);
 Spiritus vini vitis 100 c.c. (f3iiss);
 Syrupi coffeæ 75 c.c. (f3iiss).

M. Sig.: To be taken in three days (3 to 4 tablespoonfuls a day) in orangeade or a hot infusion.

3. *Morning and evening*, injection of 1 cubic centimeter (16 minims) of *camphor in oil* or of the following solution:

- \mathcal{R} Strychninæ sulphatis 0.02 gram (gr. $\frac{1}{4}$);
 Aquæ destillatæ 10 c.c. (f3iiss).

M. Sig.: For hypodermic use.

4. Free vaporizations of eucalyptus and benzoin.

5. Regular meals and substantial *diet*:

- (a) 8 A.M. Milk with sugar (200 c.c.); dry biscuit.
 (b) 10 A.M. Half-glass of champagne and one biscuit.
 (c) Noon. Chop or beefsteak, 3 tablespoons of mashed potatoes, fresh fruit, dry biscuits.
 (d) 3 P.M. Tea or coffee, with milk (250 c.c.); biscuit.
 (e) 5.30 P.M. Half-glass of champagne and one biscuit.
 (f) 7 P.M. Lean soup, one egg, fruit.

BRONCHITIS IN ALBUMINURIC, DIABETIC OR TUBERCULOUS SUBJECTS.—In albuminuric subjects, a special therapeutic indication results from the fact that the bronchitis is almost inevitably accompanied by pulmonary edema, especially in hydropic albuminuria.

Care should be taken, therefore, to refrain from the use of substances such as antipyrin, pyramidon, cantharides, blisters, etc., which might exert a harmful action on the kidneys, and with the treatment of ordinary acute bronchitis should be combined that of hydropigenous nephritis, *i.e.*, milk or chloride-free diet, cupping, if necessary wet cups over the kidneys, and derivative purgation (compound tincture of jalap, senna, cathartic enemas).

If the edema becomes threatening, venesection should be resorted to.

In diabetics, the inflammatory, infectious and gangrenous complications are those mainly to be feared, and later the development of tuberculosis. Prophylactic nasal and pharyngeal disinfection should therefore be practised freely and carefully by means of vaporizations, inhalations and aromatic and antiseptic sprays. Early use should also be made of the balsamics and internal antiseptics employed in fetid bronchitis. Codliver oil with creosote in capsules, terpinol and turpentine are particularly to be recommended in these cases. Sweetened preparations and syrups should be avoided, the remedies being preferably given in capsules, pills, cachets or drops, and blisters should not be used under any circumstance.

As for tuberculous, emphysematous and asthmatic cases, the reader is referred for their consideration to the separate sections dealing with these conditions in the present volume.

CHRONIC BRONCHITIS.

For clinical purposes it is proper to classify the cases of chronic bronchitis, from both the etiologic and the therapeutic standpoints, as follows:

1. **Simple chronic bronchitis**, primary or supposedly such, coming on independently of any diathesis or morbid temperament and of any inherited or acquired general disease.

2. **Secondary, diathetic chronic bronchitis**, manifestly dependent upon some general diathetic state, such as lymphatism, arthritism, diabetes, or albuminuria.

3. **Secondary combined or complicated chronic bronchitis:**

The commonest morbid associations, which are of greatest practical significance, are:

Chronic bronchitis and emphysema.

Chronic bronchitis and bronchiectasis.

Chronic bronchitis and asthma.

Chronic bronchitis and tuberculosis.

Chronic bronchitis and heart disorders.

Fetid chronic bronchitis and gangrene of the lung.

SIMPLE CHRONIC BRONCHITIS.

PRIMARY SIMPLE CHRONIC BRONCHITIS.—When untreated, chronic bronchitis shows no tendency toward recovery and goes through alternating periods of quiescence and recrudescence. Reduced bronchial contractility, diminution of pulmonary elasticity, and fatigue of the heart-muscles are *its commonest consequences*.

The *main indications* consist in:

1. Combatting the most usual causes of bronchial inflammation.
2. Favorably influencing the bronchial secretion in order to improve the symptoms dependent thereon—cough, dyspnea and expectoration.

I. To combat the causes of bronchial inflammation.

Nothing is more harmful in these cases than polluted, dust-laden air, of whatever source. The harm results alike from the inert particles, mineral dust, etc., which it may hold in suspension and from the bacteria which it carries about.

Open air treatment, life in the country, in the mountains, and in a suitable climate, and a change of occupation, are imperative in many cases.

Tobacco must be strictly forbidden; it irritates the larynx and the trachea, provokes cough, and keeps up a very prejudicial condition of nasopharyngeal catarrh. The same is true of wine, liquors, spices, etc.

Inflammation of the nasopharynx being frequently present, mildly antiseptic lavage of the nasal passages and pharynx twice daily (boric acid, borax or bicarbonate solutions, etc.) may be ordered.

As moist air is much less irritating than dry, dust-laden air, one should endeavor to have the air of the patient's room moistened by causing to boil in it water to which have been added eucalyptus leaves or tincture of benzoin or a mixture such as has previously been described.

II. To exert a favorable influence on the bronchial secretion.—There are many agents capable of influencing the bronchial secretion, and they may be divided into several groups:

1. The balsamic drugs, together with creosote and its derivatives.
2. The expectorants.
3. The sulphur preparations.

4. Vaccine therapy. Vaccines specially prepared and adjusted according to the indications afforded by counting the various kinds of bacteria in the sputum (*m* staphylococci, *n* streptococci, *p* tetragenus organisms) are claimed by Minet, of Lille, to have yielded encouraging results.

Further details on the subject will be found in Part I in the section on *Drugs acting on the Respiratory System*, and in Part III, under *Expectoration*.

With the foregoing agencies should be combined:

5. The sedatives, and 6, the vaso-constrictors (strychnine, ergotin) capable of acting indirectly on the bronchial secretion and its consequences (cough, hyperemia, motor paresis, etc.).

There is available, as will have been noted, an extensive series of serviceable agents, which should be judiciously employed, combined or alternated according to the clinical condition under observation.

Certain clinical as well as pharmacologic points relating thereto will facilitate their use in the individual case (see *Expectoration*).

III. To combat the symptoms—cough, dyspnea, impaired nutrition, fever.

SIMPLE CHRONIC BRONCHITIS WITH COPIOUS, EASY EXPECTORATION AND MODERATE COUGH.

I.—GENERAL HYGIENIC MEASURES.

1. Shun smoke, dust and confined air. Get accustomed to having the window open.
2. Avoid liquors, spiced foods, spices and, in general, throat irritants.
3. Avoid exposure to cold and draughts. Wear flannel undergarments.

II.—EXTERNAL MEASURES.

1. Daily *general rubs* with an aromatic lotion such as the following:

R. Spiritus lavandulæ (2 per cent. oil),
 Spiritus rosmarini,
 Alcoholisāā 60 c.c. (f3ij);
 Terebinthinæ laricis 10 c.c. (f3iiss).

M. Sig.: For external use.

The patient should be gradually hardened to cold by going through tepid ablutions (later of progressively lower temperature) previous to the rubs.

2. Vaporizations, inhalations and spraying with a combination such as the following:

℞ Eucalyptolis	2 c.c. (f3ss);
Olei thymi	10 c.c. (f3iiss);
Tincturæ benzoini	20 c.c. (f3v);
Alcoholis	q. s. ad 100 c.c. (f3iiss).
M. Sig.: For external use. One teaspoonful in a liter (quart) of water.	

III.—INTERNAL MEASURES.

For the *first ten days in the month*, 0.5 gram (7½ grains) of thiocol in a tablet, capsule or cachet to be taken four times daily.

For the *next ten days*, one of the following capsules is to be taken four times daily between meals, with a half cupful of hot infusion:

℞ Ergotæ recentis,	
Sodii benzoatis, ..	
Pulveris ipecacuanhæ et opii	āā 0.05 gram (gr. ¾);
Terpini hydratis	0.2 gram (gr. ii).
Pone in caps. No. i. Da tal. No. xl.	

For the *last ten days*, one-half to one glass of a sulphur mineral water mixed with hot milk is to be taken in the morning, gradually, according to tolerance. A further amount of the sulphur water is then used as a gargle.

In the succeeding month the sequence is repeated.

IV.—CLIMATIC AND HYDROTHERAPEUTIC TREATMENT.

In the winter the patient may be sent to one of the warmer Southern resorts, and in the summer, to the sulphur mineral springs.

SIMPLE CHRONIC BRONCHITIS WITH SCANTY, DIFFICULT EXPECTORATION AND FREQUENT COUGH.—I and II, as in the preceding section.

III.—INTERNAL MEASURES.

For the *first ten days in the month*, the patient is to take *twice daily*, just before meals and preferably with a cup of milk, *one tablespoonful* of the following combination:

℞ Sodii arsenatis	0.05 gram (gr. ¾);
Sodii iodidi	4 grams (3j);
Sodii bromidi	8 grams (5ij);
Syrupi tolu	150 c.c. (f3v).—M.

For the *next ten days*, he is to take four times daily, between meals, with a half cupful of infusion, one of the following pills:

℞ Antimonii sulphurati (N. F. IV),	
Ammoniaci	āā 0.05 gram (gr. ¾);
Pulveris ipecacuanhæ et opii,	
Terpini hydratis	āā 0.1 gram (gr. iss).

For the *last ten days*, he is to take four times daily, between meals, a tablespoonful of:

R. Tincturæ aconiti	2.5 c.c. (m̄xl);
Spiritus ammoniæ anisati (N.F.)	10 c.c. (f̄3iiss);
Decocti senegæ .....q. s. ad 200	c.c. (f̄3viss).—M.

IV.—CLIMATIC AND HYDROTHERAPEUTIC TREATMENT.

Winter: Southern resorts.

Summer: Thermal saline waters.

CHRONIC BRONCHITIS WITH EMPHYSEMA AND BRONCHIECTASIS.

This condition will be dealt with at greater length in the section on *Emphysema*.

Following is an outline of treatment for:

CHRONIC BRONCHITIS IN AN EMPHYSEMATOUS PATIENT.

1. Begin the treatment with an *emetic*, *vis.*, powdered ipecac, 1.5 grams (22½ grains), divided into 3 powders, to be taken at five minute intervals with a glass of warm water.

For the bronchitis.

2. (a) If cough is moderate and expectoration troublesome, give:

R. Tincturæ nucis vomicæ	gtt. x;
Tincturæ aconiti	gtt. xxx;
Potassii antimonatis	1 gram (gr. xv);
Aquæ laurocerasi	10 c.c. (f̄3iiss);
Syrupi ipecacuanhæ	12 c.c. (f̄3ij);
Syrupi opii (0.1 per cent.)	20 c.c. (f̄3v);
Aquæ destillatæ	120 c.c. (f̄3iv).

M. Sig.: Four to six tablespoonfuls in 24 hours (A. ROBIN).

(b) If expectoration is very profuse, creosote enemas may be given:

R. Creosoti	10 c.c. (f̄3iiss);
Decocti quillajæ (2 per cent.)	90 c.c. (f̄3ijj).

Ft. sec. art.

Sig.: One teaspoonful to one tablespoonful in 100 c.c. (3⅓ ounces) of water, to be used as an enema and retained.

(c) If the cough is dry, give:

R. Bromoformi,	
Tincturæ bryoniæ (N.F.),	
Tincturæ grindeliæ,	
Tincturæ nucis vomicæ,	
Tincturæ hyoscyami	āā gtt. xxx;
Alcoholis	25 c.c. (f̄3vj);
Syrupi opii (0.1 per cent.)	60 c.c. (f̄3ij);
Syrupi aurantii	75 c.c. (f̄3iiss).

M. Sig.: Two tablespoonfuls a day, as remotely as possible from the meals (A. ROBIN).

3. For the emphysema:

℞ Strychninæ sulphatis	0.02-0.04 gram	(gr. $\frac{1}{8}$ - $\frac{7}{8}$);
Sodii arsenatis	0.1 gram	(gr. iss);
Potassii iodidi	5 grams	(gr. lxxv);
Aquæ destillatæ	300 c.c.	(f $\bar{3}$ x).

M. Sig.: One tablespoonful with the noon and evening meals.

4. Daily chest rubs with:

℞ Olei limonis	10 c.c.	(f $\bar{3}$ iiss);
Olei rosmarini,		
Terebinthinæ laricis	āā 20 c.c.	(5v);
Styracis	4 c.c.	(f $\bar{3}$ j);
Alcoholis	175 c.c.	(f $\bar{3}$ vj).

M. Sig.: For external use.

5. Systematic open air treatment.

Balsamic inhalations.

If possible, a stay at some Southern resort in the winter.

CHRONIC BRONCHITIS WITH BRONCHIECTASIS.—For further details, see *Fetid Bronchitis*.

1. *Inhalations* four times a day from a liter (quart) of boiling water to which has been added one teaspoonful of the following:

℞ Eucalyptolis,		
Olei thymi	āā 5 c.c.	(m lxxx);
Alcoholis	100 c.c.	(f $\bar{3}$ iiss).

M. Sig.: For external use.

2. For *ten days in each month* give three times daily, between meals, a teaspoonful of the following preparation:

℞ Spiritus ammoniæ anisati	10 c.c.	(f $\bar{3}$ iiss);
Senegæ	5 grams	(gr. lxxv);
Aquæ bullientis	0.5 liter	(Oj).

Fac infusum.

For the *next ten days*, give four times daily a tablespoonful of:

℞ Sodii thiosulphatis	6 grams	(5iiss);
Syrupi eucalypti (5 per cent.)	30 c.c.	(f $\bar{3}$ j);
Syrupi acaciæ,		
Aquæ destillatæ	90 c.c.	(f $\bar{3}$ ijj).—M.

For the *last ten days*, give a daily enema of:

℞ Creosoti,		
Saponis	āā 10 grams	(5iiss);
Aquæ	q. s. ad 100 c.c.	(f $\bar{3}$ iiss).

M. Sig.: One tablespoonful in a glassful of warm water, to be used as an enema.

3. The patient should become accustomed to assuming for a few hours a position such that the chest and head will be lower than the

rest of the body, in order to facilitate by gravity evacuation of the mucopurulent secretions in the bronchi.

CHRONIC BRONCHITIS WITH PULMONARY FIBROSIS AND ASTHMATOID ATTACKS. PROGRESSIVE CARDIAC INSUFFICIENCY.—This clinical syndrome, *exceedingly common in old men*, is manifested by the ordinary symptoms of chronic bronchitis.

Cough, disseminated rhonchi, more or less copious expectoration, progressive and paroxysmal (asthmatoïd) dyspnea, and cyanosis. Upon these symptoms, recurring or permanent edema at the bases of the lungs and a tendency to dilatation of the heart, edema and passive congestion of the liver gradually superimpose the characteristics of cardiac insufficiency.

The **therapeutic indications** are:

Expectorant, with improvement of the bronchial secretions: Sodium benzoate. Dover's powder, terpin hydrate and the turpentine, tar and its derivatives, Haarlem oil, the iodides used cautiously, and the sulphur compounds used still more cautiously provide the main factors for meeting these indications.

Depletive and decongestive: Mustard packs, dry and wet cupping, and if necessary, venesection, or at least depletive vein punctures, and evacuant medication will best meet the requirements.

Heart-tonic, diuretic and detoxicant, met, in conjunction with a suitable diet, by digitalis, caffeine, sparteine, apocynum or cratægus, prescribed according to the condition present.

The actual **mode of application** of the measures is subject to many variations, as is the clinical condition itself. Following is a plan of proven efficacy:

PERIOD OF ACTIVE ATTACKS (paroxysmal dyspnea, cyanosis, edema, cardiac insufficiency, etc.):

1. Mustard wrappings of the chest twice daily.

On alternate days, four wet cups over the bases of the lungs and the liver.

If required, vein puncture (200 c.c.—7 ounces) or venesection.

2. *For the first five days:*

(a) *Milk diet* (2 liters), or a diet of *milk and fruit*, or a *fruit diet* (cooked or raw fruits, dry biscuits, infusions).

(b) *R.* Digitalis pulveris,

Scillæ pulveris,

Sodii benzoatis,

Pulveris ipecacuanhæ et opii,

Quininæ dihydrochloridi,

Ipomœæ pulverisãã 0.04 gram (gr. $\frac{2}{3}$).

Ft. pil. No. i. Da tal. No. xx.

Sig.: Four pills a day.

3. *For the next ten days:*

℞ <i>Æthylmorphinæ hydrochloridi</i>	0.02 gram (gr. $\frac{1}{8}$);
<i>Terpini hydratis</i>	0.1 gram (gr. iss);
<i>Sodii benzoatis</i>	0.4 gram (gr. vj);
<i>Theobrominæ</i>	0.3 gram (gr. v).

Pone in cachet, No. i. Da tal. No. xl.

Sig.: Three or four cachets daily.

INTERVAL PERIODS:

1. Daily chest rubs with aromatic preparations.

Wet cupping once or twice a month.

2. A *moderate mixed diet*, restricted in general, low in chlorides and proteins, and consisting chiefly of milk, vegetables and fruit.

3. (a) *For ten days in each month:*

Globules of Haarlem oil, 5 drops each; 2 to 4 globules daily.

(b) *Next ten days:*

℞ <i>Caffeinæ</i>	1 gram (gr. xv);
<i>Sodii iodidi</i>	5 grams (gr. lxxv);
<i>Sodii benzoatis</i>	12 grams (ʒiij);
<i>Syrupi aurantii amari</i>	225 c.c. (fʒviiss).

M. Sig.: Three dessertspoonfuls daily, in the middle of the meals.

(c) *Last ten days:*

℞ <i>Sparteinae sulphatis</i>	0.02 gram (gr. $\frac{1}{4}$);
<i>Pulveris ipecacuanhæ et opii</i>	0.05 gram (gr. $\frac{3}{4}$);
<i>Terpini hydratis</i>	0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xl.

Sig.: Four pills daily between meals.

OPEN AIR LIFE in the country or the mountains, at a moderate elevation.

ALBUMINURIC [NEPHRITIC] BRONCHITIS.

Following is an outline of treatment formulated by A. Robin for a case of:

Albuminuric Bronchitis with Edema of the Bases of the Lungs, Scattered Foci and Frothy, Blood-Stained Sputum.

I.—*At the beginning: Stage of dyspnea and reduced urinary output.*

1. Milk diet.

2. Wet cupping over the lumbar region. Mustard poultices and dry cups over the chest.

3. Every two hours, one tablespoonful of the following:

℞ <i>Tincturæ nucis vomicæ</i>	gtt. x;
<i>Tincturæ aconiti</i>	gtt. xx;
<i>Potassii antimonatis</i>	1.5 grams (gr. xxiiij);
<i>Syrupi ipecacuanhæ</i>	4 c.c. (fʒj);
<i>Syrupi opii</i> (0.1 per cent.)	15 c.c. (fʒss);
<i>Aquæ destillatæ</i>	110 c.c. (fʒiiss).—M.

4. If cough is persistent and paroxysmal:

℞ Extracti opii 0.01 gram (gr. $\frac{1}{40}$);
 Extracti stramonii 0.005 gram (gr. $\frac{1}{12}$).
 Ft. pil. No. i. Da tal. No. x.
 Sig.: Two or three pills a day.

II.—*At the end of forty-eight hours, diuresis is reestablished and dyspnea has passed off.*

1. Diet of milk and vegetables.

2. Chest rubs twice daily with:

℞ Tincturæ nucis vomicæ 10 c.c. (f3iiss);
 Spiritus camphoræ 100 c.c. (f3iiss);
 Terebinthinæ laricis 12 c.c. (f3iij);
 Alcoholis 90 c.c. (f3iij).

M. Sig.: For external use.

On alternate days, *dry cupping* over the lumbar region and applications of *tincture of iodine*.

3. Liquid preparation formulated under I to be continued.

III.—*At the end of two weeks:*

1. Diet of milk and vegetables.

2. General rubs with the preparation formulated under II.

3. (a)

℞ Extracti opii 0.005 gram (gr. $\frac{1}{12}$);
 Camphoræ,
 Terebinthinæ laricis āā 0.1 gram (gr. iss).
 Ft. pil. No. i. Da tal. No. lx.

(b) Hexamethylenamine in 0.5 gram ($7\frac{1}{2}$ grain) cachets.

One pill and one cachet with milk three times a day.

IV.—*Later:*

A season at some watering place (type resorts: Évian, Thonon, Vittel, Contrexéville, Martigny).

FETID BRONCHITIS.

Fetid bronchitis develops most commonly in patients suffering from chronic bronchitis with bronchiectasis. Its advent is marked by a setback in the general condition and the appearance of the characteristic feature for which the disorder is named, *vis.*, a *fetid odor of the breath and sputum*.

The physical signs are those of chronic bronchitis and bronchiectasis; they are not in any way characteristic.

This fetid form of bronchitis persists for an indefinite time, sometimes disappears permanently, or leads to a fatal termination through

a period of hectic fever, through complications, and more particularly, through pulmonary gangrene.

* * *

Apart from the general measures relating to the fluidification of the bronchial excreta and toning-up of the general system—indications existing likewise in ordinary bronchorrhea—fetid bronchitis requires a number of additional procedures having for their purpose to arrest the putrid fermentative processes and disinfect and deodorize the sputum.

These procedures are of two kinds.

The EXTERNAL procedures, *viz.*, inhalations and spraying, are intended to bring into contact with the suppurating areas agents calculated to overcome the putrid fermentations. Water vapor laden with turpentine, phenol solution, oxygen, creosote or eucalyptol has been recommended; likewise, sprays of solutions of sodium arsenate, sodium salicylate, sulphur preparations, or krameria.

In truth, none of these procedures, however serviceable otherwise, has any marked effect on the fetid odor.

Direct *remedial injections into the larynx and trachea* of preparations of the following type have been advised:

R. Iodoformi	2 grams (3ss);
Eucalyptolis,	
Guaiacolis	2 c.c. (f5ss);
Olei olivæ sterilisati	90 c.c. (f3iij).

M. Sig.: Four cubic centimeters (1 fluidram) to be injected twice daily.

Such injections sometimes yield satisfactory results.

Among INTERNAL remedies, the only ones which have seemed to have any pronounced power to reduce the bronchial suppuration are *sodium thiosulphate* (hyposulphite), *tincture of eucalyptus* and *eucalyptol*.

Sodium thiosulphate, according to Lancereaux, is the drug of choice for bronchial gangrene. Prescribed in a daily amount of 4 grams (1 dram) it rather quickly improves bronchial secretion; after four to six days a marked diminution in the foul odor and quantity of the sputum is observed. It may be prescribed simply in a gummy preparation:

R. Sodii thiosulphatis	6 grams (3iiss);
Syrupi acaciæ	40 c.c. (f3x);
Aquæ aurantii florum	10 c.c. (f3iiss);
Aquæ destillatæ	200 c.c. (f3viss).

M. Sig.: To be taken in tablespoonful doses in the course of 24 hours.

Tincture of eucalyptus [20 per cent.; unofficial in the U. S.] should be given in a daily dose of 2 cubic centimeters (32 minims), preferably in a balsamic preparation. Thus:

℞ Tincturæ eucalypti (20 per cent.) 2-3 c.c. (℥xxxii-xlviii);
Syrupi terebinthinæ (10 per cent.),
Syrupi tolu āā 30 c.c. (f3j).

M. Sig.: To be taken in dessertspoonful doses in the course of 24 hours.

The foregoing two remedies can, moreover, be readily used in combination:

℞ Tincturæ eucalypti (20 per cent.) 2 c.c. (℥xxxij);
Sodii thiosulphatis 3 grams (gr. xlv);
Syrupi acaciæ 8 c.c. (f3ij);
Syrupi terebinthinæ (10 per cent.),
Aquæ destillatæ āā 30 c.c. (f3j).

M. Sig.: One dessertspoonful every two hours.

Hypodermic injections of eucalyptol in oily solution, with or without addition of iodoform, could be given:

℞ Iodoformi 0.5 gram (gr. viiss);
Eucalyptolis 10 c.c. (f3iiss);
Olei olivæ sterilisati q. s. ad 50 c.c. (f3xij).

M. Sig.: Two to five cubic centimeters (32 to 80 minims) to be injected hypodermically in 24 hours.

Outline of Treatment for Fetid Bronchitis:

I.—EXTERNAL MEASURES.

1. Thorough ventilation of the sick room.
2. Continuous evaporation of water to which has been added per liter (quart) one teaspoonful of the following:

℞ Olei eucalypti 5 c.c. (℥lxxx);
Alcoholis 30 c.c. (f3j).

M. Sig.: For external use.

3. *Oil of turpentine*, with the addition of *creosote* if necessary, to be freely used on cloths suspended around the patient's bed.

II.—INTERNAL MEASURES.

1. ℞ Tincturæ eucalypti 2 c.c. (℥xxxij);
Sodii thiosulphatis 4 grams (3j);
Syrupi acaciæ 8 c.c. (f3ij);
Syrupi terebinthinæ (10 per cent.),
Aquæ destillatæ āā 30 c.c. (f3j).

M. Sig.: One dessertspoonful every two hours (prescription for 24 hours).

2. *In the event of high fever*: Large doses of quinine.

3. *In the event of marked depression*: Neurocardiac stimulants (alcohol, caffeine, strychnine, etc.).

4: *In the presence of marked putrescence:*

(a) Hypodermic injections of eucalyptol.

(b) Injections into the larynx: Iodoform and eucalyptol in oil.

BRONCHIECTASIS.

Chronic bronchitis with dilatation of the bronchi (bronchiectasis), apart from the therapeutic indications relating to expectoration, cough, dyspnea, etc., which apply to it in common with the other varieties of chronic bronchitis, especially fetid bronchitis, lends itself to two important special considerations.

1. The *frequency of syphilis* as a cause of bronchiectasis in childhood and adolescence, which renders it amenable to mercurial medication. (Indeed, the possibility of syphilis should always be thought of in chronic bronchial disorders in childhood, particularly in asthma.) The auscultatory and fluoroscopic evidences show rapid improvement under mercurial treatment. *Neoarsphenamin seems especially indicated in these cases, as in pulmonary gangrene.*

2. Rist and E. Weill reported three cases of infantile bronchiectasis practically cured by artificial pneumothorax.

3. Pneumotomy with drainage and disinfection of the suppurating cavity is theoretically applicable only in cases with a single, large bronchiectatic cavity of precisely known location, with putrid contents and giving rise to serious symptoms. The mortality has been high.

Intratracheal injection of lipiodol is an excellent diagnostic measure. On the screen, the opaque fluid depicts in less than one minute the small ramifications in the inferior lobes. If the fluid is not in sufficient quantity (5 cubic centimeters), it will penetrate only into the left bronchus; if the injection exceeds 10 cubic centimeters, it will penetrate into both lungs. The patient should be gradually accustomed to the lipiodol by daily doses of 1 to 2 cubic centimeters, 10 to 20 cubic centimeters being finally reached.

PULMONARY GANGRENE.

Gangrene of the lung occurs either as a complication of fetid bronchitis or as a primary condition in cachectic subjects or following the penetration of bits of food into the respiratory passages, in paretics, etc. The focus of gangrene may open into the pleura and the symptoms of a *general or local putrid pneumothorax* be added to the clinical picture.

The *prophylactic treatment* consists:

1. In vigorously treating the fetid bronchitis as previously described.
2. In carrying out careful disinfection of the nasal passages, mouth and pharynx in all diseases which frequently involve the lungs (influenza, measles, etc.).
3. In preventing the entrance of food into the respiratory tract in paretics, in hemiplegics, in cancer of the tongue, etc.
4. In carefully treating purulent or necrotic foci in the mouth, pharynx or larynx.

The *medical treatment* is similar to that already described for fetid bronchitis (eucalyptol and sodium thiosulphate), but the indication for the use of stimulants (alcohol, coffee, caffeine, camphor in oil, strychnine, etc.) is more imperative in these cases.

Bacteriologic examination of the sputum will give useful indications. If it shows a *fuso-spirillar* combination of organisms *neoarsphenamin* should be employed in daily increasing doses of 0.15, 0.3, up to 0.6 gram. If, on the other hand, the bacteriologic examination shows only common anerobic germs, *antigangrenous serum* in conjunction with *anti-pneumococcic serum* should be used.

Among the anerobic germs there are distinguished the telluric organisms (*B. perfringens* and *B. œdematis maligni*—"vibrion septique,"—found on the surface of the ground), for which a specific serum is available, and the germs not derived from any external infectious medium (*B. fragilis*, *B. ramosus*, etc.), for which no specific serum is known. Resort is had to a mixture of serums. If one injects subcutaneously 40 cubic centimeters, the mixture comprises antiperfringens serum, 20 cubic centimeters; antioœdematis serum, 10 cubic centimeters, and antivibrio serum, 10 cubic centimeters. These doses are sometimes repeated daily, and some patients have been given as much as 600 cubic centimeters in a few days.

The mode of introduction causing the least "shock" is the subcutaneous route, with the use of large doses of serum. This procedure may be combined with intratracheal injections. If one decides to give intravenous injections, they should be preceded by a preparatory intravenous injection of 1 cubic centimeter of antiperfringens serum diluted in 10 cubic centimeters of physiologic salt solution and given very slowly (Dufour, Semelaigne and Ravina), followed in a half hour by a second, similar injection. One hour after the latter, there is injected intravenously a mixture of 40 cubic centimeters of antiperfringens [*B. ærogenes capsulatus* or *Welchii*] serum, 20 cubic centimeters of antioœdematis serum, and 20 cubic centimeters of serum against the *B. œdematis maligni* ("vibrion septique"), the whole diluted

in 500 cubic centimeters of saline solution. Shock symptoms should be combated with injections of camphor in oil and of adrenalin.

Intratracheal injections of 20 cubic centimeters of *gomcnol in oil*, 1:10, have given good results in the hands of Guisez.

In the subacute forms, *tincture of garlic* in doses of 20 to 50 drops daily per mouth, continued for several days, acts as an antiseptic, but also lowers the blood-pressure to a slight extent.

Artificial pneumothorax, by collapsing the cavity, can cure only a unilateral gangrene, in which the pleural cavity has remained free. The first pleural puncture should be made at a distance from the gangrenous focus, and the compression should be gradual. According to P.-E. Weill, artificial pneumothorax should take the place of pneumotomy, the prognosis of which is so bad. Tuffier has suggested detaching the parietal pleura from the chest wall in order to push it in towards the lung, thus creating an extrapleural pneumothorax. Roux-Berger maintains the pleural detachment with a bag to be inflated. Pneumectomy can be indicated only in certain cases of localized bronchiectasis.

If there is *gangrenous pleurisy*, or putrid pneumothorax, free *thoracotomy* with frequent copious antiseptic irrigations should be carried out as an emergency measure. Excellent results are sometimes obtained.

BRONCHITIS WITH BRONCHOPLEGIA.

In treating any case of acute or chronic bronchitis, paralysis of the bronchial tubes should always be thought of, that it may receive due treatment.

This indication is a constant one in all cases of chronic bronchitis, as bronchoplegia is constant in this condition. It exists also in acute bronchitis: 1. When the dyspnea, in the absence of all cardiac disease, is disproportionate to the auscultatory signs. 2. When bronchial obstruction is rapidly increasing. 3. When the bronchitis, persistent and refractory to treatment, is becoming subacute and threatens to pass into the chronic stage. (See above: *Influenzal Bronchitis*.)

* * *

By a chance observation I was able to verify—as had already been done by many others—the potent effect to be expected from *ergot in some cases of chronic bronchitis*. In the case of an old woman suffering from pulmonary catarrh of long standing, I was called in one day on account of repeated attacks of hemoptysis, without fever, following congestion of the bases of both lungs. Treating the case symptomatically,

I prescribed, among other things, the following cardio-tonic hemostatic pills:

℞ Extracti hyoscyami	0.01 gram (gr. $\frac{1}{60}$);
Quininæ sulphatis	0.05 gram (gr. $\frac{3}{64}$);
Extracti ergotæ aquosi (N. F.)	0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: One pill every two hours, except at night (6 to 8 pills in the 24 hours).

I had the satisfaction of seeing the hemorrhages stop almost immediately, and the catarrhal condition gradually improve. Since then, I have used the drug systematically, and generally with success, in many cases of chronic bronchitis.

Renaut, who has systematized the use of ergot in chronic bronchitis, has adopted the following plan. For the first four days in each week he gives the balsamic drugs: Terpin hydrate, syrup of Canada balsam [*Terebinthina Canadensis*, U. S. P. VIII], syrup of tolu, and capsules of Venice turpentine [*Terebinthina laricis*, N. F. IV]. The last three days he administers ergotin in suppositories, combined with opium or hyoscyamus:

℞ Extracti hyoscyami	0.01 gram (gr. $\frac{1}{60}$);
Opii	0.1 gram (gr. iss);
Extracti ergotæ aquosi (N. F.)	0.3 gram (gr. v);
Olei theobromatis	q. s.

Ft. suppos. No. i.

One might also prescribe for five days a week six of the following pills, to be taken in three doses daily, along with a hot infusion sweetened with syrup of tolu:

℞ Extracti hyoscyami	0.01 gram (gr. $\frac{1}{60}$);
Terpini hydratis	0.1 gram (gr. iss);
Extracti ergotæ aquosi (N. F.)	0.05 gram (gr. $\frac{3}{64}$).

Ft. pil. No. i. Da tal. No. xxx.

EMPHYSEMA.

Pulmonary emphysema consists essentially in a permanent overdistention of the air-vesicles with loss of their elasticity.

Two functional manifestations are predominant in its clinical symptomatology: *Dyspnea on exertion* and *bronchial catarrh*, very often present in combination.

Two physical signs are especially characteristic: *Diminution of the vesicular murmur* and *reduced difference between the chest circumference in inspiration and in expiration*.

Two groups of causes are mainly concerned in its production:

1. *Mechanical causes*, abrupt expiratory efforts (typically, cough

paroxysms) overdistinging the air-vessels. 2. *Trophic causes* (typically, pulmonary tuberculosis, hyperemia of cardiac origin, etc.), leading to impaired nutrition and diminished resisting power of the alveolar tissue.

Idiopathic emphysema is uncommon. Usually, emphysema is secondary to some bronchial or cardiac disorder, to obesity, to arteriosclerosis or to Bright's disease; sometimes it represents a defensive measure against tuberculosis.

Two complications are the most common accompaniments: *Asthma* and *heart weakness*.

* * *

Such are the main features which govern the treatment of emphysema. The pathologic condition itself is beyond the resources of medical art; one cannot restore to the degenerated lung tissue its original elasticity.

The *indications* to be met are as follows:

1. To treat and, if possible, cure the bronchial catarrh—a constant cause of aggravation of the emphysema.

2. To improve ventilation of the lungs, mainly by influencing expiration, which is particularly hindered in these cases.

3. To avoid for the patient the mechanical causes of distention of the air-vesicles.

4. To treat the causal disorders, if the emphysema is secondary.

5. To sustain the heart and combat congestive tendencies.

6. To facilitate oxygenation by insuring for the patient a proper air-supply, which is rendered all the more indispensable by the functional insufficiency of his pulmonary ventilation.

* * *

1. Treatment of the Bronchial Catarrh.—This coincides with the treatment of chronic bronchitis as already described. At the most, it may be added:

(a) That one should exercise particular caution in the administration of sulphur compounds, since, I repeat, very often a heart condition, renal disease or a latent tuberculosis is concealed behind the mask of emphysema.

(b) That one should as much as possible facilitate expectoration and allay cough, which is a potent cause of aggravation of the emphysema; liquefacient and sedative agents, especially iodides, and the opiates are the drugs which are the most active and most to be recommended for meeting this indication.

(c) That, since bronchoplegia is almost constant in emphysema, it will be well to add from time to time the neuro-cardiobronchial stimulants (strychnine, ergot, etc.) (see *Bronchitis with Bronchoplegia*), provided, however, there is no tendency to asthma in the case under treatment.

2. Improvement of Pulmonary Ventilation.—For this purpose the main resources are *pneumotherapy* and *kinesitherapy*.

Pneumotherapy consists essentially in having the patient spend a period of time in a specially disposed room in which he is able to breathe out into a rarefied atmosphere (1:50 to 1:30). In some establishments he is also enabled to inspire compressed air. It must be admitted that pneumotherapy has scarcely entered into general practice, because such establishments exist only in a few large cities and a few bathing resorts; that the treatment takes a long time (requiring many sittings to give results), is expensive and burdensome, and requires daily excursions which are often contraindicated by the general condition of the patient, and that it may be attended with risk in heart cases and arteriosclerotics, who, as is well known, are legion among the emphysematous.

Pneumotherapy so far remains an exceptional procedure, applicable only in special institutions in a few large cities, for patients in good circumstances and under very close medical supervision, especially as regards the circulation.

Kinesitherapy, on the other hand, in its three principal forms—gymnastic exercises, massage and mechanotherapy—is of great value in the treatment of emphysema and is available for general application. The procedure has already been discussed in sufficient detail in a special section on respiratory gymnastics. At this point only a few typical illustrations of the procedure can be given; these, however, are subject to very many modifications according to individual requirements. The object sought is to obtain more complete expiration, the chest being, as it were, immobilized in the inspiratory position by the disease. This object is attained by the following procedures:

1. Combination of the act of expiration with progressive pressure exerted over the ribs with the upper extremities placed in contact with the body and thus compressing the chest walls. The elbows should, on the other hand, be taken off of the body during inspiration. The patient can thus readily acquire the ability to increase very appreciably his breathing capacity. The earlier sittings should be short, regulated with the metronome at a slow rate (10 to 12 per minute), and supervised, controlled and directed by the physician himself, who should also train the patient to breathe out with the abdomen and chest at the same time (see *Respiratory Exercises*).

The following exercise has also been recommended. It is more potent, perhaps, but less practical and attended with greater risk: The patient lies on his abdomen, with his arms crossed behind his back, the soles of the feet applied against the foot of the bed, and the upper part of the chest and the forehead resting on cushions. In this posture, he breathes as deeply as possible, combining with the expirations strong extensor movements of the lower extremities whereby the chest is compressed against the cushion under the chest. There is no doubt that such a proceeding, while perhaps feasible in the case of a young and robust emphysematous subject, is absolutely contraindicated in an aged individual, heart case or invalid.

2. Combination of the respiratory exercise above described with passive movements consisting of rhythmic compression of the chest walls and abdomen, carried out by the physician or a trained masseur, after the manner of artificial respiration.

Other procedures that have been recommended for these cases are rapid, zigzag effleurage, vigorous rubbing with the finger-tips, successive strokes on the back, kneading of the serratus magnus and intercostal muscles, and vibrations of the entire chest, tending to reinforce the respiratory muscles and facilitate expectoration.

3. The use of one of the many forms of apparatus, some of which are very simple and ingenious, devised to secure a mechanical, passive increase in the amplitude of respiration. The simplest and probably the most serviceable is that of Strümpell, consisting of two small curved boards held together at one end by a strap. The boards are applied to the sides of the chest, with their united ends posteriorly and their free ends from 30 to 60 centimeters (12 to 24 inches) apart anteriorly. By using the anterior ends as levers during expiration the patient is enabled to exert more or less powerful pressure on the chest walls and correspondingly increase the respiratory excursion.

Along the same lines, various forms of waistcoats, corsets, belts and elastic compressors have been devised. These devices are inferior to the preceding apparatus because all of them, while "deepening" expiration, impede inspiration to a varying degree.

4. Several devices of Zander's have been put together with the same end in view. Particular mention may be made of that in which the axillæ are by leverage successively moved upward and backward (inspiration) and forward and downward (expiration), the spinal column being kept practically motionless by a cushion.

Various combination devices influencing the movements of the trunk are also available.

In mild or medium grades of emphysema, these procedures may be combined with tepid or warm hydrotherapeutic measures, *e.g.*, a sponge tub bath or hot chest douche under pressure ("jet brisé"), increased in duration gradually from two to five minutes.

All of these kinesitherapeutic measures are contraindicated in the presence of fever, hemoptysis, endocarditis, atheroma, etc.

3. Avoidance of Mechanical Causes of Alveolar Distention.—Any existing bronchitis attended with cough, which promotes emphysema, should be carefully treated, and preventive hygienic measures calculated to ward off bronchitis should be rigidly carried out in all emphysematous cases.

For the same reasons, the patient should be forbidden prolonged or frequent climbs (mountains, stairs, hilly streets), the carrying of heavy weights (bales, packages, handbags, mattresses, etc.), prolonged exertions (laborious coitus, troublesome defecation) and the playing of wind instruments. Hearty meals should likewise be interdicted. The patient should be advised to rise from bed slowly and to dress himself "by stages."

Manifestly, the choice of the patient's occupation is a matter of the greatest importance. Insofar as is possible, all occupations that involve his staying in a confined, miasmatic or prejudicial atmosphere and those which require sustained effort, forcible movements or prolonged use of the voice should be forbidden. "The emphysematous patient should be neither a miner, a coal-heaver, a stone-cutter, a pit-sawyer, a carpenter, a miller, a baker, a brush-maker, a furrier, a thresher, nor a weaver; nor should he be a mirror-maker, a porter, a glass-blower, a singer, a bugler, etc." (Combemale). This list of forbidden occupations might easily be further extended.

4. Treatment of the Causal Disorders.—If the emphysema appears to be dependent on a heart condition, Bright's disease, obesity, arteriosclerosis, tuberculosis, etc., suitable treatment should be applied for these conditions underlying the disturbances of nutrition of the pulmonary walls and the active or passive congestions which, in conjunction with the mechanical factors previously enumerated, are inducing the distention of the air-vesicles characteristic of emphysema.

5. To Sustain the Heart and Combat Congestive Tendencies.—Daily rubs, the occasional application of dry cups or even wet cups in the presence of cyanosis or plethora, mustard applications to the chest and moist wrappings are the measures calculated to antagonize congestion, while neurocardiac tonics (*digitalis*, *sparteine*, *strychnine*) may be used for the heart.

6. Proper Aëration.—This general indication, applying to all disorders of the respiratory organs, is more imperative in the emphysematous patient with his reduced respiratory area, slackened combustion, and nutrition interfered with by inadequate oxygenation.

The patient should be accustomed to the "open window" mode of life, and the tendency toward dwelling in confined, air-tight quarters exhibited by a few of these patients combated. The "air hunger" of the majority should be relieved. Selection of a suitable room, sunny and easily ventilated, opening over a broad highway with as little dust as possible, is of capital importance.

From the *climatic standpoint*, in the *summer*, resorts that are warm, moist, well sheltered from winds, and of intermediate elevation are best suited for emphysematous patients with bronchitis or asthma.

A locality surrounded by forests is to be preferred, and the seashore may, if necessary, be resorted to. But the special point to be borne in mind is that a high elevation is attended with risk in these cases. A rarefied atmosphere is scarcely indicated where respiration is already reduced; upon exposure to it the dyspnea increases, circulatory inadequacy becomes more marked and the heart disturbance grows worse; having left home with emphysema, the patient comes back a heart case. The dryness of the air and the abrupt, extensive variations of temperature are, furthermore, poorly borne. In short, *high elevations are absolutely contraindicated in emphysema*; such a patient should not go above 1000 meters (3280 ft.).

Due distinctions should, however, be made between different cases: The more pronounced the emphysema, the more danger attends a high elevation; the milder the emphysema, the better elevation is borne. It is even possible that at the start—but only at the start—altitude, with the automatic respiratory exercise it entails, may be a favorable influence in emphysema. *In severe emphysema a low elevation is better borne than the mountains.*

In the *winter*, a warm climate, in well sheltered localities, should be sought; or, the patient may simply be advised to reside in one of the most favorable sections of the city in which he lives.

7. Mention should be made of the fact that **vaccine therapy** (staphylococci, streptococci and tetragenus organisms) is stated by Minet (see *Presse méd.*, July 13, 1921) to have yielded pronounced improvement in some cases.

Results from autogenous vaccines appear to be superior to those obtained with stock vaccines.

1.—Outline of Treatment for Pulmonary Emphysema with Chronic Bronchitis.

I.—EXTERNAL MEASURES.

1. *Morning and evening*: A fifteen-minute séance of systematic respiratory exercises with forced expiration by rhythmic compression of the chest in expiration, either with the upper extremities or Strümpell's apparatus.

2. Daily chest rubs with the hair-glove after the respiratory exercises, preceded, if necessary, by a sponge bath or warm chest pack.

3. On alternate days for a month, painting with tincture of iodine, anteriorly and posteriorly in alternation.

For the next month, a weekly application of dry cups.

4. Frequent vaporizations of water containing eucalyptus leaves; systematic care of the upper respiratory passages (see *Bronchitis*).

II.—INTERNAL MEASURES.

(a) For ten days in the month, in the morning, *tincture of iodine* in amounts ascending from 10 to 20 drops in a half cupful of hot and sweetened milk.

(b) For the next ten days, one of the following pills three times daily between the digestive periods:

℞ Pulveris ipecacuanhæ et opii,
Sodii benzoatis,
Lobeliæ pulverisāā 0.05 gram (gr. $\frac{3}{4}$);
Extracti senegæ 0.1 gram (gr. iss);
Balsami tolu q. s.

Ft. pil. No. i. Da tal. No. xxx.

(c) For the last ten days, one tablespoonful of the following solution just before the noon and evening meals:

℞ Strychninæ sulphatis 0.02 gram (gr. $\frac{1}{4}$);
Sodii arsenatis 0.05 gram (gr. $\frac{3}{4}$);
Aquæ destillatæ 300 c.c. (f $\frac{3}{4}$ x).—S.

III.—GENERAL HYGIENIC MEASURES.

1. Choice of a warm, moderately moist climate and a well sheltered locality, with pure air; also a sunny apartment, easily aired; windows to be kept open as much as possible.

2. Avoid ascents, exertions, carrying heavy objects, playing wind instruments, and violent exercise.

On the other hand, take regular, systematic, progressive walks on flat or slightly rising ground.

3. A regular, light diet, taken in small or moderate meals, restricted in quantity and properly selected (fatty, heavy and indigestible foods to be excluded; likewise articles rich in purins).

Two days a week: A stringent milk diet or milk and vegetable diet without salt.

II.—**Treatment for Combined Emphysema and Asthma.**—See *Asthma*.

III.—**Treatment for Emphysema Complicated with Cardiac Insufficiency (Intermittent Partial Heart-Failure).**—In addition to the treatment described under I:

1. Repeat at frequent intervals the application of dry cups to the hepatic and posterior thoracic regions.

2. Impose regularly and conjointly once a week:

(a) Absolute rest.

(b) Restriction of food intake: Exclusive milk diet; $1\frac{1}{4}$ liters of milk taken in four divided amounts at regular intervals.

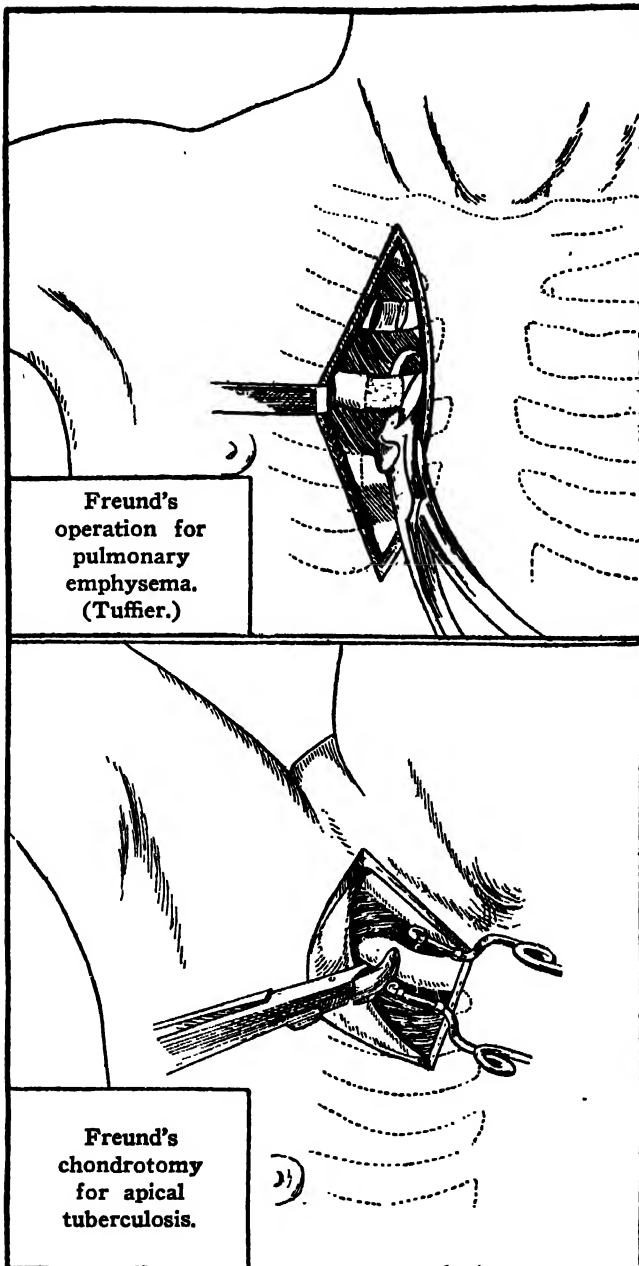
(c) Administration of 30 drops of the 1:1000 solution of French crystallized digitalin [equivalent to 9 grains of digitalis leaf].

3. *At a more advanced stage in the heart disturbance:* If the right heart has yielded and the kidneys are permeable, strophanthus may be resorted to, in the form of 20 drops of the tincture, to be taken in one day in three divided amounts.

SURGICAL TREATMENT OF EMPHYSEMA.—Freund, in 1858-59, brought out the new conception that in emphysema it is not the dilatation of the lungs which brings about the chest deformity but that, on the contrary, it is a primary thoracic distortion which causes secondarily a dilatation of the lungs, and that this chest distortion is the result of premature senile involution of the cartilages, leading to a loss of the elasticity of these cartilages which is necessary for mobility of the ribs. The ossified cartilages immobilize the ribs and sternum in the inspiratory position, whence the globular, barrel-shaped appearance of the chest and the impossibility of descent of the ribs during expiration.

On the basis of this conception, Freund recommended resection of the 2d, 3d, 4th and 5th costal cartilages. The first chondrectomy was not performed until 1906. Since then the number of reported cases has reached or exceeded 100.

Study of this clinical material yields a definite impression confirming the *a priori* opinion that could be expressed regarding Freund's theory, *viz.*, that if this theory is correct, it applies only to a rather limited number of cases. The results obtained, excellent in exceptional instances, are ordinarily unimpressive, most frequently *nil*, and sometimes very bad: Rather many cases of death have been recorded. One cannot but subscribe, as regards the indications, to the conclusions expressed by Tuffier: 1. Medical and surgical investigations should at the present



Figs. 303 and 304.

time be directed toward the distinction to be established between classic emphysema and rigid dilatation of the thorax. 2. I now recognize as indications for operation only despair in medical treatment and the presence of well demonstrated lesions of the costal cartilages.

In short, indications for chondrectomy are exceptional; they do not spring, it would appear, from the emphysema *per se*, but from certain malformations of the chest with chondral "senility" accompanied by manifestations suggesting those of emphysema.

ASTHMA.

Asthma can no longer be considered a definite morbid entity, but must be viewed as a bronchospastic syndrome of paroxysmal dyspnea of varying and complex causation.

The bronchospastic manifestation to which the efferent path of the reflex leads, *viz.*, the asthmatic "attack," is common to all forms of asthma, but the starting-point of the afferent stimulus is variable. The symptomatic treatment of the paroxysm is practically the same in all forms, but the pathogenetic causal treatment is radically different in different types of cases.

Asthma results from vaguesympathetic imbalance, related, in turn, to an endocrin imbalance. Very often some source of irritation is at the bottom of the excitation of the pneumogastric, *e.g.*, a respiratory irritation (bronchitis, fibrosis) or a digestive irritation (aërophagia, aërocolia, ptoses, bands, chronic appendicitis).

* * *

From the practical, clinical standpoint, at least, the different types of asthma may conveniently be classified thus:

I. **Essential (idiopathic) asthma.**—Dependent mainly upon a *diathetic predisposition* of the "neuro-arthritic" type. The exciting cause may be trifling and determination of it impossible. It may alternate with skin manifestations (urticaria, eczema, etc.). It is met with chiefly in families of the neuro-arthritic type (lithiasic, obese, gouty, diabetic, neurotic, etc.); it generally tends to subside with age. Atropine and calcium salts sometimes exert an almost specific action on it. It constitutes essentially a *bronchospastic neurosis predominantly vagotonic*.

II., **Mixed symptomatic asthma**, in which are to be found:

(a) *A predisposition to reaction by bronchospasm*; a diathetic, frequently inherited form of the preceding type.

(b) *An exciting cause* (nasal, gastro-hepato-intestinal, uterine, etc.), more or less obvious, but which would not induce asthma in an unpredisposed subject.

III. **True symptomatic asthma**, dependent upon a cardio-arterio-renal disorder (cardiac asthma, arteriosclerotic asthma, uremic, or better, nephritic asthma); *pseudo-asthma*, beneath which is concealed cardiac, vascular or renal insufficiency; *pseudo-asthmatics*, who are simply patients with cardiac, arteriosclerotic or renal disease, and must be treated as such.

SYMPTOMATIC TREATMENT OF THE ATTACK.—Asthmatic attacks do not show material differences in accordance with their respective causes; the two essential features are: 1. A *pneumo-spastic disturbance, dyspnea*. 2. A *secretory disturbance, catarrh*.

Clinically, they are to be distinguished merely according to their severity.

1. **Minor attacks** are mainly characterized by their brevity, their mildness and the ease with which they are controlled.

They are generally dispelled by one of the many anti-asthmatic powders, papers or cigarettes, the commonest constituents of which are stramonium, hyoscyamus, belladonna, opium and nitrates. The result is always produced through ingestion with the saliva and inhalation of the "spasm-inhibiting" fumes set free from the preparations referred to.

It should be remembered that while a given preparation may succeed brilliantly in one case it may fail miserably in another, and that it is often necessary to try different preparations before the effectual one is found.

Following, by way of illustration, are two typical formulas of anti-asthmatic powders:

- | | | |
|-------|------------------------------------|---------------------|
| (1) R | Sodii peroxidī pulveris | 1 gram (gr. xv); |
| | Cascarillæ pulveris, | |
| | Benzoini pulveris, | |
| | Opii pulveris | 2 grams (3ss); |
| | Lobeliæ pulveris | 5 grams (gr. lxxv); |
| | Potassii nitratis | 15 grams (3ss); |
| | Stramonii pulveris, | |
| | Belladonnæ foliorum pulveris | 35 grams (3ix).—M. |
| (2) R | Opii pulveris | 1 gram (gr. xv); |
| | Potassii nitratis, | |
| | Digitalis | 5 grams (gr. lxxv); |
| | Tincturæ benzoini | 10 c.c. (f3iiss); |
| | Aquæ laurocerasi | 20 c.c. (f3v); |
| | Stramonii pulveris | 30 grams (3j); |
| | Hyoscyami pulveris | 40 grams (3x); |
| | Belladonnæ foliorum pulveris | 60 grams (3ij).—M. |

The first preparation is to be finely powdered and kept dry. The second is to be desiccated after admixture, then powdered and passed through a sieve.

For use, a teaspoonful of the mixture is made into a conical pile on a small, flat shovel or metallic plate and ignited at the apex of the cone, the patient then inhaling the fumes.

These fumes contain benzoic acid, pyridin, traces of hydrocyanic acid, and the alkaloids of opium, stramonium, belladonna and hyoscyamus—all recognized antispasmodics.

Their prolonged or too frequently repeated use may induce the customary toxic effects of atropine (dryness and redness of the throat and skin, mydriasis, dizziness and perhaps hallucinations and delirium), which are to be distinguished from the asthmatic symptoms.

Inhalations of ether, chloroform or ethyl iodide yield satisfactory results in some patients.

Allowance should also be made, in respect of the antispasmodic effect obtained, for the possible influence of suggestion, which is always an effectual agency in overexcitable cases, such as all asthmatics are.

2. Intermediate Attacks.—These are more prolonged, recur in periods of two to five days, are more refractory to medication and are accompanied by a more pronounced catarrhal flow.

In such a case it will be well to make the patient comfortable in bed, sitting up and supported by cushions or pillows or by an overturned chair in contact with the wall against which the bed is located, or better, still, sitting in a comfortable armchair, with the body warmly wrapped, but relieved of all constriction and with the neck and chest perfectly free. The room should, if possible, be large, airy, well lighted, with the window open if the weather permits, or at any rate, with good ventilation insured.

The patient should be made to inhale, as already described, the fumes liberated from an anti-asthmatic powder, cigarette or paper. Recourse may also be had to inhalations of pyridin.

Pyridin, C_5H_5N , is a liquid, highly volatile basic substance occurring in small amounts in the smoke set free from burning paper, tobacco, belladonna, stramonium, etc., and which possesses the properties, of great service for asthmatics, of acting: 1. As a reducer of medullary and spinal irritability. 2. As a liquefacient in respect of the bronchial secretions. 3. As a rapidly acting vasodilator (acting on the coronaries). The patient is made to inhale two or three times a day for twenty to thirty minutes the fumes from a teaspoonful of pyridin in a saucer.

In late years, nasal sprays have been widely resorted to in the treatment of asthmatic attacks. Many asthmatics are provided with a pocket atomizer and subdue their attacks by spraying into the nose a fluid which most commonly consists of a glycerinated solution of atropine with or without addition of cocaine, *e.g.*:

R Atropinæ sulphatis	0.5 gram (gr. viiss);
Cocainæ hydrochloridi	1 gram (gr. xv);
Glycerini	24 c.c. (f3vj);
Aquæ	q. s. ad 100 c.c. (f3iiss).

M. Sig.: Poison, for external use.

R Atropinæ sulphatis	0.2 gram (gr. iij);
Sodii nitratis	0.8 gram (gr. xij);
Glycerini	2.4 c.c. (m xl);
Aquæ destillatæ	q. s. ad 20 c.c. (f3v).

M. Sig.: Poison, for external use.

A procedure to be highly recommended and which is of unquestionable efficacy is the repeated administration of *hot foot-baths*, and especially *hot hand-baths*. Cupping, moist packs and mustard poultices are capable of giving appreciable service.

Dietary measures will usually complete the treatment. There should be no hesitation in ordering one or two days of complete restriction to water or infusions, concurrently with one or two saline purges. During the periods of asthmatic attacks, one should allow, at the most, a lean soup diet or, if necessary, a milk diet, with saline purgation always in order (unless there be some special contra-indication).

Drugs should be employed sparingly. Ordinarily it is best to refrain from their use; yet it must be said—and upon this is based the extraordinary and long-standing reputation of the iodides among patients—that the **iodides sometimes act like a specific in these cases**. It is well to bear in mind that one should be particularly cautious in their use (or even abstain from it) in nephritic cases, heart cases, and individuals predisposed to iodine intoxication (see Part I). If no contra-indication exists, if the tolerance of the patient for iodides is known, and if iodide elimination is regular, *potassium iodide* may be prescribed in large doses of 1.5 to 3 grams (22½ to 45 grains); if its action is *nil* or merely doubtful, its use should not be continued.

Combination of the iodide with *caffeine*, possibly on account of the diuretic action of the latter, seems to be indicated in asthma. Thus:

R Caffeinæ	1 gram (gr. xv);
Sodii benzoatis	3 grams (gr. xlv);
Potassii iodidi	5 grams (gr. lxxv);
Syrupi	75 c.c. (f3iiss);
Aquæ tiliaë (25 per cent.)	100 c.c. (f3iiss).

M. Sig.: One tablespoonful every three hours (five a day).

Combination with *codeine* is likewise strongly indicated (see *Codeine*).

Bromides, antipyrin and chloral hydrate might be of service in cases with marked nervous excitement, refractory spasm, insomnia, etc.; but, in general, it is best to drug the patient as little as possible.

3. Major Attacks.—Such an attack is featured chiefly by its impressive, alarming intensity, its duration (six to ten days) and its obstinacy.

It is, as a rule, little influenced by the foregoing remedies and often requires the use of two heroic agents: *Adrenalin* and *morphine*.

Adrenalin exerts a powerful relaxing action on the bronchial walls, and many attacks yield so promptly and definitely to it that one is tempted to consider it practically a specific for asthmatic attacks.

Emergency treatment of the attack comprises:

1. An anti-asthmatic powder.
2. Cupping.
3. *Adrenalin*.

It is well to begin with very small doses of *adrenalin*, which are often as effective as full doses.

A hypodermic injection of 0.0005 gram ($\frac{1}{120}$ grain) of *adrenalin* is given, using a solution diluted to 1:5000 (2.5 cubic centimeters—40 minims), or, better, a mixture of papaverine and *adrenalin* may be employed. The injection should be given as soon as possible after the onset of the paroxysm, with the patient recumbent. It is practically free from risk if the case is neither a high blood-pressure nor an aortic case. The patient should be warned of the palpitations and tremor which the injection may cause. It is necessary, where the patient is having recurrent attacks, not to repeat the injections too often. The same recommendation is applicable to asthmatics who use *adrenalin* for preventive purposes.

In any attack lasting a considerable time, the heart should be watched and sustained with camphor in oil, and, if necessary, strychnine.

The *intra-bronchial spraying* of a solution of novocaine-suprarenin under bronchoscopic control is with difficulty applicable in practice.

If one is compelled to use *morphine*, the following formula is appropriate:

R Atropinæ sulphatis	0.01 gram (gr. $\frac{1}{60}$);
Morphinæ hydrochloridi	0.1 gram (gr. iss);
Aquæ destillatæ	10 c.c. (f3iiss).

- S. Sig.: For hypodermic injections of 1 cubic centimeter (16 minims), according to needs.

Morphine should be used very sparingly, the possibility of morphinism being always kept in mind. Yet one should not, solely on account of the regrettable but uncertain possibility of habit formation, allow the asthmatic patient to run the certain risk of a violent, prolonged attack which might lead to serious secondary disturbances.

In case one were compelled, by force of circumstances, to continue the use of morphine for a few days, one might try to employ its substitutes (diacetylmorphine in pills or solution, morphine and scopolamine in combination, etc.), and particularly the combination of *potassium iodide* with *codeine*.

* * *

Treatment of Asthma by Respiratory Exercises.—Some relief is at times obtained by means of the following procedure:

The patient seized with an attack of asthma is instructed to count out loud and breathe only after having reached a certain figure. The patient counts slowly: 1, 2, 3, 4, 5, 6, and takes a short inspiration; he resumes the counting, 7, 8, 9, 10, 11, 12, takes another short inspiration, counts further, and so on for five, eight or ten minutes. While the patient is counting out loud, he carries out a series of slow expirations which drive the air out of his lungs, while the infrequent and short inspirations are bringing in only that amount of air which is just sufficient. Gradually, the distention of the lungs, *i.e.*, the original cause of the whole trouble, lessens and the attack rapidly comes to an end.

In the intervals between attacks, respiratory exercises are always useful, with or without the assistance of Gagey's special table for respiratory training or Pescher's spiroscope.

The exercises can be carried out simply with a bottle filled with water into which the patient blows from 10 to 20 times. Inverted over a basin of water and connected with the patient's mouth by means of a tube and nozzle, the bottle is emptied as he blows in—without much effort—1 or 2 liters of air, which displace 1 or 2 liters of water. Lance's apparatus and D'Heucqueville's pneoscope simplify the procedure by doing away with the filling of the bottle otherwise required every time it is emptied.

Respiratory training is effected in accordance with the principles laid down by Brown: The patient breathes in quickly and deeply but breathes out very slowly, gradually and avoiding all muscular effort. Standing with his arms held forward in such manner that the palms face each other, he carries out an inspiration while throwing the arms and shoulders back and an expiration while carrying the shoulders

slowly forward. He goes through this sort of exercise for fifteen and then twenty minutes each day, and later for two periods daily.

* * *

CAUSAL TREATMENT OF ASTHMA.—It is in seeking out the underlying cause of the asthmatic state that the therapist is called upon to display to the utmost his clinical ability and capacity for patient investigation, for upon this inquiry essentially depends the institution of curative treatment. No investigation requires more care, and if at times he succeeds in detecting the exciting “thorn” immediately, more often a prolonged and minute inquiry will be required for the purpose, for “anything is possible in asthma, and even in the presence of certain bizarre phenomena, skepticism would be in error” (Brissaud).

In actual practice, one should first look for the six groups of causes which are by far the commonest:

1. *Neuro-arthritis.*
2. *Pulmonary causes.*
3. *Cardio-arterio-renal causes.*
4. *Gastro-hepato-intestinal causes.*
5. *Toxic-infectious causes.*
6. *Excessive nasal irritability.*

Thus, almost the whole of internal medicine has to be systematically gone through. There is perhaps no other disorder in which it is more necessary to consider the case individually. Each of the above groups, moreover, should, to represent accurately the observed clinical conditions, be subdivided into clinical varieties.

I. Asthma of Neuro-arthritic Origin.—This is the commonest form and represents what was formerly known as essential asthma.

From the therapeutic standpoint, the two factors, *autointoxication* and *excessive reflex excitability* afford the outstanding general indications; the special indications depend upon the varying predispositions of the subject, his idiosyncrasies, his anaphylactic intolerances—to use the prevailing terminology.

The dietetic, general hygienic and medicinal indications will now be reviewed.

A. Diet.—From the special, individual standpoint, much attention should be paid to the data supplied by the patient, in whom certain food substances act like actual asthmogenic poisons. Intolerance of this sort has been noted in relation to eggs, shell-fish, onions, garlic, mustard, red wine, etc. In general, one should advise the patient

to avoid ingestion of bouillons and meat extracts, internal viscera, pork products, game, preserved meats, shell-fish, fermented cheeses, leguminous vegetables, sorrel, mushrooms, chocolate and alcoholic beverages.

Aside from these special instructions, a diet low in toxics and purins and reduced as to quantity should be prescribed (see *Dietetics*).

In asthma the distribution of the meals is of extreme importance. In view of the manifest influence of digestion on the onset of attacks, and the nocturnal proclivity of these attacks, the evening meal should be reduced as much as possible; there are even cases in which it will be found advantageous to omit this meal entirely and substitute a simple collation at about 5 o'clock.

As already stated, however, it is necessary to deal with these cases individually; renal permeability, in particular, demands careful study. I owe several brilliant cures of recurring, refractory asthma with insufficient elimination of chlorides to the institution of a *chloride-free diet*. The intermittent strict vegetarian diet has also yielded several gratifying successes in my experience.

B. General Hygienic Measures and Physical Therapy.—In this direction particularly should the therapist's sagacity be brought into play, and it is rather difficult, without going to excessive lengths, to give even an approximate idea of the measures indicated.

"Theoretically," writes Moncorgé, "the best *climatic habitat* is one at a moderate altitude, neither too hot, nor too cold, nor too dry, nor too damp, sheltered from strong winds, and with a pervious soil."

In practice, one must expect the most peculiar climatic idiosyncrasies: A given locality is asthmogenic for a certain asthmatic patient, generally without our being able to tell why; here, as in respect of the diet, the actual observations of the patient will have to be taken carefully into account.

Let it be merely noted that, in a general way, wide variations of temperature or of barometric pressure are seriously felt by asthmatics, who usually adapt themselves poorly to high altitudes, to the ocean (except the Mediterranean) and sometimes even to the country (nasal asthma). The reaction to climate is a good criterion of recovery from asthma.

Conditions of *habitat* and *occupation* also play an important rôle. Darkness, dampness, confined air, dust and smoke are injurious to asthmatics, who should be quartered in large, sunny, well lighted and airy rooms, as free as possible from dust and smoke. Accordingly, they should not shut themselves up in the winter by the side of a dusty, poorly drawing stove or chimney, but should get accus-

tomed to having the window open, at least for the greater part of the day.

There is no doubt that air baths, light baths and sunbaths, when correctly applicable, are extremely useful.

One can well understand how *certain occupations* may be very prejudicial, either by reason of the close confinement they entail or because of the dust, odors or fumes with which the subject is compelled to remain in contact (office boys, floor-cleaners, furriers, barbers, perfume workers, etc.).

Moderate walking, gymnastic exercises, especially *respiratory* exercises, and mild sports (bicycle riding, automobiling, etc.) may exert a very favorable effect.

Overwork, emotions and grief are to be avoided.

Obviously, also, all indulgence in intoxicants (tobacco, alcohol, morphine, and various analgesics, such as antipyrin) is to be combatted.

Hydrotherapy should be instituted in combination with *rubs* and *massage*. It should be used particularly with the intention of hardening the patient by habituation and training to the asthmogenic variations and excitations.

Accordingly, the warm jet douche or rain douche (38° C.—100.4° F.) should be prescribed, to be gradually cooled to a tepid temperature (28 to 30° C.—82.4 to 86° F.); next the Scotch douche with warm jet (38° C.) over the chest, as a percussion douche, for two minutes, followed by a cold jet (28° C.) over the chest ("brisé") for twenty seconds; next the Scotch douche followed by a jet douche made gradually colder (28 to 18° C.—82.4 to 64.4° F.), and finally, if possible, the brief cold douche (15 to 18° C.—59 to 64.4° F.) for five to twenty seconds. It should be kept in mind, however, that the last of these procedures is strongly asthmogenic, and that it should be attained only slowly, cautiously, under careful medical supervision; it may be considered a good criterion of recovery.

The tepid *sponge bath* is a good substitute, if required; it should be taken in a warmish room and in the absence of bronchitic exacerbations.

Tepid *baths* (35° C.—95° F.) of an average duration of fifteen to twenty minutes twice weekly may be useful for sedative purposes. Carbon dioxide baths, which frequently exert a favorable influence, may be tried.

Daily vigorous *chest rubs*, carried out either dry with the hair-glove or with alcohol in small amount, may be recommended.

Finally, *massage*, alike passive (tapotage, pétrissage) and active (Swedish gymnastics, respiratory exercises), is strongly indicated.

C. Medicinal Treatment.—This is the essential part of the treatment from the viewpoint of the patient, who attaches undue importance to the medicine to be taken. It should, on the other hand, be regarded only as of collateral importance by the physician, who

should lay stress on the above-mentioned hygienic regulations and should devote much more attention to inquiring into and overcoming faulty conditions (climate, locality, diet, occupation, etc.) and to detecting and relieving inherited or acquired forms of excessive irritability than to drugging his patient.

Iodine and its compounds are the outstanding representatives of the time-honored drug treatment of asthma.

Their action on respiration is exerted, according to G. Pouchet, in three ways: 1. The increase of bronchial secretion following the transudative hyperemia results in liquefaction of the viscid exuded material and its more easy expulsion, with consequent more active entrance of air into the lungs and more active gaseous interchange. 2. Greater activity of the intrapulmonary circulation, with resulting correction of venous stasis and enlargement of the respiratory area. 3. The enhanced activity of the circulation and increased gaseous interchange reduces the relative amount of CO₂ contained in the blood, with consequent diminution of the stimulating influence exerted by the blood on the medulla. This eupneic effect on the medulla is thus exerted indirectly.

The *clinical rules governing the administration of the iodides in asthma* are well summarized in the following three propositions (Moncorgé):

1. First make sure of the perfect organic and functional integrity of the liver and kidneys. In women and children the doses given should be small.

2. The ideal conditions for iodide administration comprise a normal, or even rather strong, pulse, slackened general metabolism, and a local bronchial disturbance. Iodide treatment under these conditions brings into play a causal (anti-arthritis) form of medication as well as a local, eupneic influence.

3. The dosage of iodide should not be too large, nor its use continued too long.

Intermittent administration in moderate dosage (0.5 to 1.5 grams—7½ to 22½ grains) for ten to twenty days appears to me best.

With the iodide may, when required, be combined sparteine (for heart weakness), extract of opium (for dyspnea or marked cough), senega or lobelia (for catarrh), bromides (for nervous erethism) or sodium arsenate (for poor nutrition).

One might prescribe:

R Potassii iodidi (C. P.) 10 grams (3iiss);
Aquæ destillatæ 300 c.c. (f3x).

S. Sig.: One tablespoonful *morning* and *evening* at the beginning of the meals.

℞ Extracti opii	0.3-0.5 gram	(gr. v-viiss);
Potassii iodidi	10 grams	(3iiss);
Aquæ destillatæ	300 c.c.	(f3x).

M. Sig.: One tablespoonful *morning* and *evening*.

℞ Extracti opii	0.3-0.5 gram	(gr. v-viiss);
Tincturæ stramonii	6 c.c.	(f3iss);
Tincturæ lobeliæ,		
Tincturæ senegæ (20 per cent.)	12 c.c.	(f3iij);
Potassii iodidi	10 grams	(3iiss);
Aquæ destillatæ	300 c.c.	(f3x).

M. Sig.: One tablespoonful *morning* and *evening*.

℞ Sodii arsenatis	0.1 gram	(gr. iss);
Sodii iodidi	10 grams	(3iiss);
Sodii bromidi	20 grams	(3v);
Aquæ destillatæ	300 c.c.	(f3x).

M. Sig.: One tablespoonful *morning* and *evening*.

Substitution of sodium or strontium iodide for the potassium salt may be tried.

In the event of intolerance of the iodides, an attempt may be made to replace them by one of the many organic compounds or pseudo-compounds of iodine (iodone, iodalose, iodogenol, lipiodol, iodipin, etc.) or simply by tincture of iodine [10 per cent; Codex], 10 to 25 *drops* in an adult, administered with a meal in milk, wine or sweetened water.

Belladonna, highly recommended by Bretonneau and Trousseau, sometimes gives very good results. As suggested by these observers, one might prescribe:

℞ Extracti belladonnæ,	
Belladonnæ foliorum pulveris	āā 0.01 gram (gr. ¼).

Ft. pil. No. i. Da tal. No. xx.

Sig.: One to four pills daily, in ascending dosage.

Or:

℞ Extracti valerianæ,	
Extracti hyoscyami,	
Zinci oxidi	āā 0.05 gram (gr. ¼).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: Three pills daily.

Adrenalin, as already mentioned, acts selectively on the bronchial spasm, which it overcomes by stimulating the sympathetic as antagonist to the vagus. It is, however, rather a remedy for the attacks than a fundamental agent; it acts on the symptom, dyspnea, but not on the exciting cause; it is inhibitory, but not curative. The attendant should not be restrained by it from looking into the underlying causes of the asthma and treating them.

MINERAL SPRINGS IN THE TREATMENT OF ASTHMA.—In the preparation of this section I have borrowed freely from the monograph by Maurice Ségard, entitled: "*Les asthmatiques aux eaux minérales.*"

The factors in a hydropathic and climatic cure include: Elevation, climate, the waters and their physicochemical properties, the therapeutic armamentarium and the medical personnel at the resort.

I.—GENERAL CONDITIONS.

The asthmatic requires a *moderate elevation* (300 to 1100 meters—1000 to 3600 feet), but more particularly an equable climate in a locality *well sheltered from winds* and not subject to sudden reductions of barometric pressure.

The *mineral waters* should be such as to yield sedation of the bronchi and exert a more or less gentle stimulating effect on the general condition in accordance with the spasmodic or sluggish nature of the disorder; collaterally, the waters should influence the catarrhal state. The weak sulphur waters, the arsenical and the sulph-arsenical waters, and certain waters of low mineral content are indicated because they combine with their anti-arthritic, anti-diathetic properties a detergent and anti-spasmodic effect.

The *armamentarium* should include halls for hydrotherapy, sprays, inhalations, vaporizations and respiratory exercises.

The *medical personnel* should be trained in the diagnosis of the various forms of asthma and in the application of the therapeutic devices afforded at the resort.

II.—SPECIAL CASES.

A. **NEURO-ARTHRITIC ("ESSENTIAL") ASTHMA.**—Individuals predisposed by inheritance to asthma, *i.e.*, the sons and grandsons of asthmatics, and the neurotic group, are benefitted by such a resort as Mont-Dore. It is at an elevation of 1050 meters, and its waters, of low mineral content, contain, in particular, carbonates and silica, with a small amount of iron and traces of arsenic; their temperature ranges from 38 to 47° C. (100.4 to 116.6° F.), and there is an abundance of carbon dioxide; the armamentarium is appropriate. Whatever cure is gone through, however, one should be guided by the manner in which the patient reacts. If he reacts poorly to waters such as these, weak sulphur waters may be selected—remembering that strong sulphur waters are too stimulating to be suitable for these cases.

Other resorts may be availed of where the asthma alternates with eczema, prurigo, psoriasis or urticaria, or where the patient is of the "lymphatic" type.

B. **ASTHMA OF RESPIRATORY ORIGIN.**—A change of environment and of altitude is indicated in such cases, but the locality selected must be one sheltered from high winds, reflected sunlight and pollen. The sensitized (anaphylactic) type of case is benefitted by the soothing form of treatment afforded, *e.g.*, at Mont-Dore. If the patient is a young subject exhibiting intermingled reactions of lymphatism and arthritism, benefit will be obtained from a resort such as Saint-Honoré, sedative by reason of its favorable climate at a moderate altitude, and slightly tonic through the sulphur and arsenic content of its waters.

In the presence of the *bronchial* form of asthma or of asthma complicated with chronic bronchitis, the weak sodium sulphide waters, the calcium sulphide waters rich in free H₂S, or the sulphur and arsenic waters may be selected. The sulphide waters act through their antiseptic properties, and also stimulate the bronchial

mucosa and exert favorable effects on its circulation, sensation and secretion. There are some springs, such as that of the Crevasse, at Saint-Honoré, which present a serviceable combination of both sulphur and arsenic in therapeutic amounts. On the other hand, strong sulphur waters make sensitive bronchi worse. High altitudes are similarly contraindicated in cases with a weakening myocardium and in nervous subjects, who sleep poorly at high elevations.

The combination of *asthma*, *bronchitis* and *emphysema* is a common condition. Where there is copious expectoration, betokening some degree of bronchial dilatation, and provided the heart is still of good resisting power, there are no cures that can compare with the sodium sulphide and *sulphur-arsenic* cures, since these act on the catarrhal condition with their sulphur and on the emphysema with their arsenic. On the other hand, in an arthritic subject with dry catarrh and recurring lung congestion, a resort of the Mont-Dore type is especially indicated.

Where there is no tendency to fever and lung congestion, the *tuberculous asthmatic* is certain to derive benefit from a well-planned cure. If an erethistic reaction is feared, a resort such as Mont-Dore is to be preferred, while the torpid, lympho-arthritic cases could be sent to other resorts, such as Saint-Honoré and La Bourboule.

C. In **ASTHMA OF DIGESTIVE ORIGIN**, it is well to prescribe, before the anti-asthmatic cure proper is gone through, a season at one of the resorts indicated for digestive disorders, such as Vichy. There are various resorts suited, respectively, for cases of gastric hypersthenia, cholemia or diabetes, for those of gastric hyposthenia, for those with intestinal spasm or with intestinal atony, and for women with utero-adnexal disturbances.

D. **CARDIO-ARTERIAL ASTHMA** is related to fibrosis of the myocardium or aorta or to renal insufficiency. Here the principal indication is to sustain myocardial resistance and renal permeability. The special asthma resorts already referred to are contraindicated; neither the altitude nor the waters would be suitable for them. Various different resorts are available for the patients with uremic tendencies, nervous symptoms or a sluggish gouty condition.

* * *

The **thermal treatment** of asthma consists of:

1. The *ingestion of waters* that are antidiathetic, antispasmodic and mildly tonic.
2. *Sprays, inhalations and vaporizations*, whereby the medicinal vapor is brought into contact with the respiratory mucous membrane, with resulting decongestion and detergent action.

In the individual spray devices, the mineral water, carried along by air or steam pressure, is forcibly projected against a plate or sieve; an impalpable mist is thus obtained which the patient, by breathing deeply, causes to enter as far as possible into his bronchi.

In the collective inhalatoriums at Mont-Dore, the water is atomized by steam and air under pressure; the patients stay in these halls for fifteen minutes to one hour, at a temperature between 28 and 32° C. (82.4 and 89.6° F.).

At Saint-Honoré, inhalations are carried out with the Collin apparatus. The water, forced at high pressure into large hollow spheres perforated with holes, emerges in superposed sheets from which the gases are given off freely. The inhalation ends with a very hot foot-douche which produces a derivative and decongestive effect much superior to that resulting from a foot-bath.

At La Bourboule, the water is broken up into a mist by being projected against a plate of bronze or against the center of a metallic cone revolving at high speed. At Alleverd, it is broken up by repeated falls onto a series of plates.

3. *Various procedures*, such as gargling, pneumotherapy, respiratory exercises, etc., suited to the case and in appropriate dosage. In spasmodic rhinitis local douches should be used only with great circumspection.

4. Lastly, *hydrotherapy* constitutes one of the most important measures. Frequently, tepid baths (36° C.—96.8° F.) are given, or half-baths (up to the waist) in tubs. Many patients take a morning douche at 38° C. (100.4° F.) for about two minutes, followed by a jet douche at 20° C. (68° F.) for ten seconds. After a vigorous rubbing, the patient then goes back to bed for at least an hour. The douche-bath consists of a bath at 36° C. for twenty minutes, followed by a prolonged douche at 38–40° C. (100.4°–104° F.), lasting three or four minutes; at the end of the séance the room is filled with vapor, so that benefit from the douche-bath is further enhanced by inhalation.

In some resorts, at a time remote from the attacks, short baths in running water in the piscines, at the natural temperature of the springs (28–30° C.—82.4–86° F.), are prescribed; such baths exert an excellent tonic effect on young patients of the lymphatic type.

OUTLINES OF INSTRUCTIONS FOR ASTHMATIC CASES.

I. **Neuro-arthritic Case without Complications aside from the Paroxysmal Periods.**—1. *Diet low in toxic materials* (see above), with two days in each week of *strict milk diet* (2 liters a day) or of fruit diet.

2. *A daily douche*, at first *warm* (38° C.—100.4° F.), next *tepid* (30° C.—86° F.), then *cold* (20° C.—68° F.), if possible; to be followed by:

A *chest rub*, either dry or with the following mixture:

℞ Olei limonis	10 c.c. (f5iiss);
Olei rosmarini,	
Terebinthinæ laricis	20 c.c. (f5v);
Styracis	4 c.c. (f3j);
Alcoholis	175 c.c. (f3v)).

M. Sig.: For external use.

3. ℞ Sodii arsenatis	0.1 gram (gr. iss);
Sodii iodidi	10 grams (5iiss);
Sodii bromidi	20 grams (5v);
Aquæ destillatæ	300 c.c. (f3x).

S. Sig.: One tablespoonful *morning and evening* with the meals for ten days in one month and twenty days the next.

4. Carefully avoid smoke, dust and marked variations of humidity or of temperature.

II. Asthma of Pulmonary Origin.

First two days.—1. The customary triad of measures: (a) Burn an anti-asthmatic powder (if it is well borne and gives relief); (b) cover the chest with dry cups (two to four wet cups over each base on the first day), or apply mustard poultices if the odor of mustard

is not disagreeable to the patient; (c) give immediately a hypodermic injection of 0.0005 gram ($\frac{1}{430}$ grain) of adrenalin.

2. Milk, infusions, vegetable broth, Vichy or Vals water.

3. On the morning of the second day, give 30 grams (1 ounce) of sodium sulphate for detoxicant purposes. If one fears the lassitude caused by the purgative, inject subcutaneously an ampule of ether, camphor or strychnine in oil.

What is to be done if the dyspnea has not yielded? (No treatment is infallible).

4. Give in sweetened water or a half cupful of milk three times a day, 20 drops of:

℞ Benzylis benzoatis 5 c.c. (℥ lxxv);
Alcoholis 25 c.c. (f3vj).—M.

(Ségard was unable to confirm the favorable results reported in North America from the use of benzyl benzoate.)

5. To procure some *surcease at night*, have the patient take in the evening, with an infusion, a tablespoonful of syrup of chloral hydrate (5 per cent.), or give a chloral enema (after a cleansing enema):

℞ Chloralis hydratis 0.75 gram (gr. xij);
Vitelli ovi 1;
Lactis 210 c.c. (f3vij).—M.

Or a suppository:

℞ Extracti cannabis,
Extracti belladonnæ āā 0.01 gram (gr. $\frac{1}{6}$);
Olei theobromatis 3 grams (gr. xlv).
Ft. suppos. No. i.

Or the following sedative:

℞ Extracti cannabis 0.1 gram (gr. iss);
Syrupi acaciæ 15 c.c. (f3ss);
Aquæ destillatæ 45 c.c. (f3iiss).

M. Sig.: One tablespoonful in the evening and one in the middle of the night.

Third day.—Either the patient now has free expectoration or he has none at all. If the former, he will experience relief rather quickly; if the latter (because this is the usual form his asthma assumes), cupping or poulticing should be renewed. To liquefy the dry secretion and bring about its expulsion, one may order:

Either: 1. Three tablespoonfuls a day of:

℞ Syrupi senegæ 24 c.c. (f3vj);
Syrupi ipecacuanhæ 1 c.c. (℥ xvj);
Syrupi acaciæ 20 c.c. (f3v);
Aquæ destillatæ 75 c.c. (f3iiss).—M.

Or: 2. Five tablespoonfuls a day of:

R̄ Sodii iodidi	4	grams (3j);
Tincturæ lobeliæ	2.25	c.c. (℥ xxxvj);
Syrupi (vel syrupi tolu)	18	c.c. (f3ivss);
Aquæ menthæ piperitæ	25	c.c. (f3vj);
Aquæ destillatæ .....q. s. ad	150	c.c. (f3v).

Unless the pilular form be preferred:

3. R̄ Pulveris ipecacuanhæ et opii,
 Extracti marrubiiāā 0.05 gram (gr. ¾);
 Scillæ pulveris 0.03 gram (gr. ss).

Ft. pil. No. i. Da tal. No. xx.

Sig.: Five pills a day.

The convalescent patient may remain depressed.—If the tongue is still coated, a gentle saline purge should be given.

The patient may begin to take milk products (if he likes them), with eggs, milk, clear soups, and a little mashed potato and fruit compote.

To counteract weakness: Give each morning a hypodermic injection of a combination of strychnine, sodium glycerophosphate and sodium cacodylate.

To dry up very copious secretion, give each morning a hypodermic injection of an ampule of:

R̄ Guaiacolis	0.1	c.c. (℥ iss);
Iodoformi	0.02	gram (gr. ⅛);
Eucalyptolis	0.2	c.c. (℥ iij);
Olei olivæ sterilisati	2	c.c. (℥ xxxij).—M.

To sustain the heart, if a severe attack or repeated paroxysms have threatened to cause collapse:

Give for the first two days in each week, preferably on awakening, and for as long a time as may seem desirable, a suitable dose of digitalis or crystallized digitalin (French), *e.g.*, 0.1 to 0.25 gram (1½ to 4 grains) of digitalis leaves.

Lastly, as a *basic treatment for chronic bronchitis*, have prepared from the patient's bronchial secretions ampules of *autogenous vaccine*, to be injected in series. The successive injections should not be given until the reaction from the preceding injection has subsided; such reactions are sometimes alarming. This treatment should be instituted only if the heart is sound.

III. Asthma of Cardiac Origin.—I. DURING THE PAROXYSMAL PERIOD.

1. Relieve the heart by:

(a) A *reduced diet of water and milk*: At most 1½ liters of fluid in the 24 hours.

(b) *Venesection*, 200 cubic centimeters (7 ounces), or *wet cups* over the kidneys.

2. *Stimulate the heart* by:

(a) Injections of *camphor in oil* twice daily.

(b) Administration of *digitalis* to the amount of 0.001 gram ($\frac{1}{65}$ grain) of French digitalin [equivalent to 1 gram (15 grains) of digitalis leaf] in two days.

3. *Allay the paroxysmal nervous erethism* by daily *hypodermic injection* of 0.01 gram ($\frac{1}{6}$ grain) of *morphine*.

II. BETWEEN THE PAROXYSMAL PERIODS:

1. An alternating diet: Milk (2 liters), milk and vegetables, and mixed and chloride-free.

2. Intermittent administration of:

℞ Sparteinæ sulphatis	0.5 gram	(gr. viiss);
Sodii iodidi	3 grams	(gr. xlv);
Aquæ aurantii florum	20 c.c.	(f3v);
Syrupi	60 c.c.	(f3ij);
Aquæ destillatæ .....q. s. ad	150 c.c.	(f3v).

M. Sig.: One tablespoonful morning and evening for ten days in each month.

3. The *general hygienic measures* indicated in heart cases.

IV. **Asthma of Gastro-hepato-intestinal Origin.**—This is a form which is very common among heavy eaters and dyspeptics.

To be sure, not all asthmatics are dyspeptics; but in a few, brilliant success will be attained merely by eliminating aërophagia, lifting up ptotic viscera with a corset, and relieving a solar plexus which is in distress.

1. Stress is to be persistently laid on the diet, which should be more stringent and better adjusted to the individual patient than is the case with the general diet described in Part I. Some patients will have to accept a milk diet for a few days. All the patients will have to avoid the use of cabbage, fats, spices and cold liquids.

2. After meals, hot compresses over the epigastrium. A hot sand-bag over the back of the neck if the patient feels an attack of asthma coming on.

3. For ten days, in the middle of the noon meal and of the evening meal (which should always be light), a powder of 1 gram (15 grains) of *sodium bromide* in a little milk (Leven). The daily dosage of 2 grams, which is always well borne, is necessary. Not less than this should be given, as it would be ineffective, nor more, as it would be useless, and above 2 grams the drug is sometimes poorly borne.

4. For the next ten days, in the middle of the two meals, a powder of 1 gram (15 grains) of *bismuth subcarbonate*.

5. For the next ten days, in the morning, on an empty stomach:

℞ Kaolini pulveris loti 10 grams (3iiss);
 Agar 2 grams (5ss).—M.

This is to be mixed in a half teacupful of cold water in the evening for use the next morning. Before ingestion, it is boiled for fifteen minutes and passed through a strainer. It should be drunk as hot as possible. (Léon Meunier gives twice this amount in severe dyspepsia and in ulcer cases.)

V. Asthma in Glandular Insufficiency.—A. **Hypothyroid** cases (headache, asthenia on awakening, sensitiveness to cold, alopecia of the lateral portion of the eyebrows):

For five days, on awakening, a cachet of 0.01 gram ($\frac{1}{6}$ grain) of *dried thyroids*.

Then intermit for ten days and resume for five days.

Keep a watch on the pulse-rate and stop the drug if it gets above 100 while the patient is at rest. It should also be suspended during the menstrual periods or if joint exacerbations occur.

B. **Hypo-ovarian** cases (menopause, hysterectomy, congenital ovarian insufficiency):

1. For ten days, before the two principal meals, a cachet of 0.1 gram ($1\frac{1}{2}$ grains) of dried ovarian gland.

Or, if combined thyro-ovarian insufficiency exists, 0.015 gram ($\frac{1}{4}$ grain) of thyroid with 0.1 gram of ovary.

Five or ten days of organotherapy should be alternated with the following two measures:

2. For ten days:

℞ Calcii chloridi,
 Calcii lactatisāā 5 grams (gr. lxxv);
 Syrupi cydoniæ 24 c.c. (f5vj);
 Aquæq. s. ad 150 c.c. (f3v).

M. Sig.: One tablespoonful in a little sweetened water before the two larger meals. Stop at the tenth day.

3. In the presence of low blood-pressure and the "white line" phenomenon, give for five days, between meals, five times a day, 10 drops of 1:1000 adrenalin solution diluted in a little water.

Or: A cachet of 0.05 gram ($\frac{3}{4}$ grain) of dried suprarenals three times daily between meals.

Here again, one may be led by the presence of a syndrome relating to several glands to prescribe several products in combination. Thus:

℞ Suprarenali sicci	0.05 gram (gr. $\frac{1}{4}$);
Ovarii sicci	0.1 gram (gr. iss);
Thyroidei sicci	0.02 gram (gr. $\frac{1}{8}$).

Pone in caps. No. i. Da tal. No. xv.

Sig.: One capsule with each of the two larger meals for periods of five days, with intervals of ten days.

VI. Hay Fever and Hay Asthma. Asthma Due to Anaphylactic Sensitization.—A. **Hay Asthma.**—1. First of all go over the nasal cavities and nasopharynx: Remove spurs, adenoids, polyps, etc.; reduce the hyperesthesia of certain areas of the mucous membrane by mild cauterizations.

2. As a more immediate *prophylactic treatment*, begin, six weeks before the seasonal attack, a series of ten to twenty subcutaneous injections of *pollen vaccine* (Parke, Davis and Co. or Mulford), beginning cautiously with small doses and regulating the dosage and intervals (three to seven days) according to the reactions.

If, for any reason, pollen vaccine cannot be injected, the solution of calcium chloride and lactate formulated above should be prescribed during the three weeks preceding the expected onset.

3. *When an attack threatens:* Spray into the nose with an atomizer 1 cubic centimeter (16 minims) of 1:1000 adrenalin solution or 2 cubic centimeters (32 minims) of a 1:2000 solution (these amounts *not to be exceeded*).

4. *If this fails*, place in the atomizer the contents of an ampule formulated thus (2 c.c. for adults only):

℞ Cocainæ hydrochloridi	0.003	gram (gr. $\frac{1}{20}$);
Atropinæ sulphatis	0.00025	gram (gr. $\frac{1}{200}$);
Liquoris epinephrinæ hydrochloridi	2	c.c. (℥ xxxij).

(The patient should spray in only one-half of this amount, the remainder being required for proper functioning of the atomizer.)

5. *If the paroxysm sets in* in spite of these measures:

(a) Inject subcutaneously 0.0005 gram ($\frac{1}{130}$ grain) of adrenalin in a very dilute solution.

(b) Give twice daily one of the following pills:

℞ Belladonnæ foliorum pulveris,	
Extracti belladonnæ	0.01 gram (gr. $\frac{1}{6}$).
Ft. pil. No. x.	

(By proceeding gradually and watching the effects, three and later four pills a day can be attained.)

Or, again:

(c) Morning and evening, one of the following cachets (modified Florand formula) in a half-cupful of infusion:

R Sodii salicylatis	0.15 gram (gr. iiss);
Caffeinæ valeratis,	
Scillæ pulveris	0.05 gram (gr. ¾);
Theobrominæ	0.5 gram (gr. viiss).

Pone in cachet. No. i. Da tal. No. x.

Another measure: A tablet of 0.5 gram (7½ grains) of acetylsalicylic acid or of antipyrin.

(d) *During the course of the attack* of hay fever, nothing is easier than to obtain some blood with a syringe at the bend of the elbow. One can then:

Either reinject immediately 10 cubic centimeters of the whole blood under the skin of the abdomen.

Or, without removing the puncture needle from the bend of the elbow, merely tilt it out of the vein and inject 2 cubic centimeters of the blood into the subcutaneous cellular tissue at the bend of the elbow. The injection is repeated on alternate days.

Flandin prefers autoserotherapy. Blood is withdrawn from the patient having an attack, and placed in the ice-box for six to twelve hours. Aseptic decantation is carried out, and ½ and later 1 and 2 cubic centimeters of the serum injected under the skin of the arm.

Ségar prefers the injection of whole blood. He collects 5 cubic centimeters of venous blood at the bend of the elbow and reinjects it immediately (no citrate required in the syringe if one works quickly) into the buttock. These injections are repeated five or six times at three- or four-day intervals.

B. Other Forms of Asthma the Result of Anaphylaxis.

(Where no cause in the various body structures has been located.)

(a) The asthmatic patient may be *desensitized*:

If he is a meat eater, by taking, three-quarters of an hour before the noon and evening meals, a cachet containing 0.5 gram (7½ grains) of purified *peptone*. This is to be continued for fifteen days without stopping.

The results are not always as favorable as they have been reported.

If the asthma is due to *eggs*, he takes, three-quarters of an hour before the meal, 5, then 10, then 15 and 20 drops of fresh white of egg.

If the asthma is brought on by the odor of horses or stables, subcutaneous injection of 0.2 cubic centimeter of *horse serum* may be tried, cautiously at first. The injections should be repeated on alternate days, increasing gradually through 0.33 cubic centimeter, then 0.5 cubic centimeter, then 1 cubic centimeter, but stopping in case of any anaphylactic reaction, which is always serious, and treating it with hypodermic injections of adrenalin and of ether. Horse serums (antidiphtheritic, antitetanic, etc.) have caused death in asthmatic subjects.

(b) Treatment by the induction of *anaphylactic shock* is feasible.

This should be ventured upon only after failure of the usual medicinal measures—iodides, valerian, adrenalin, belladonna, ether, etc.

Unfortunately, it is impossible to forecast or adjust the intensity of the reactions, which may be of dramatic severity whenever an injection of a foreign protein is carried out by the intravenous route. The procedure can be recommended only in adults; and even then it is necessary that the heart and major emunctory organs (kidneys and liver) be perfectly sound. The patient should always be warned of the possibility of "shock," *i.e.*, of chills, high fever and malaise. During the injection an assistant should count the pulse out loud and cause the injection to be stopped when the pulse rate exceeds 35 to the quarter-minute.

In truth, the intravenous route is an *exceptional* one in this procedure.

Three hours after a light meal an intravenous injection (through a very fine needle, yielding an extra-slow stream) may be given from an ampule formulated thus:

℞ Peptoni purissimi	0.25	gram (gr. iv);
Sodii chloridi	0.025	gram (gr. ⅔);
Aquæ destillatæ	5	c.c. (℥lxxx).—M.

The ampule should be sterilized for fifteen minutes in the autoclave. An entire ampule should not be used at the first injection. Later, in accordance with the reactions observed, 5 and even 6 cubic centimeter doses may be given. (Any ampule the contents of which is not absolutely clear should be discarded.)

Instead of the foregoing procedure a very slow intravenous injection of 30 cubic centimeters (1 fluidounce) of sterilized Hayem's solution [sodium chloride, 5; sodium sulphate, 10; distilled water, 1000] may be given.

The reaction is less severe if one of the following procedures is substituted:

1. *Intramuscular* injection of 5 to 10 cubic centimeters of peptone and sodium chloride solution.

2. *Subcutaneous* injection of the polyvalent vaccine of Minet and Benoist; one injection every two or three days for twenty days.

3. *Subcutaneous* injection of the G (anti-grippe) vaccine of the Institut Pasteur, which affords not only shock treatment but also paraspecific bacterial therapy (pneumococcus and Pfeiffer's bacillus). Ségard has had many successful results (recoveries as well as temporary improvements) and some failures with this vaccine, but never any untoward effects.

4. *Subcutaneous* injection of a polyvalent vaccine combining the commoner components of the bacterial flora in asthmatics: Staphylococ-

cus, streptococcus, pneumococcus, enterococcus, and the catarrhalis organism.

Such injections induce a local and general reaction of moderate intensity. In the absence of contraindications (condition of the heart or kidneys, or an exaggerated reaction), they should be repeated every three days, on an average, or after a longer interval if the reaction from the preceding injection has not yet completely subsided.

* * *

VII. Asthma in Children.—In these patients the same diversity of causes and treatments for asthma exists as in adults. Thus, infantile asthma may be *bronchitic* (treatment similar to that given under I), or *dyspeptic* (treatment as in II, with diet and medicinal treatment in doses adjusted to the age of the patient), or *naso-pharyngo-tracheal* (examination and operation by an oto-rhino-laryngologist).

To do good work in these cases it is necessary to trace out the cause and overcome it.

Treatment of the Attack.—1. Burn a thimbleful of *anti-asthmatic powder* (provided it is not rejected by the patient, is well borne and does good).

2. Give in a little sweetened water or on a half-lump of sugar 2 drops of *Spiritus ammoniac anisatus*, N. F., or of Hofmann's anodyne.

3. Administer immediately a subcutaneous injection of 5 cubic centimeters (80 minims) of physiologic salt solution to which have been added, according to age, 1 to 5 drops of 1:1000 adrenalin solution (Marfan).

4. Give three or four teaspoonfuls a day of the following:

℞ Syrupi codeinæ (N. F. IV),
Syrupi ætheris (2 per cent. by weight + 5 per
cent. alcohol)āā 30 c.c. (fʒj).
(MARFAN).

5. Every four or six hours wrap around the chest a towel dipped in water at 22° C. (71.6° F.), then at 18° C. (64.4° F.), and covered with some impervious material.

6. In the presence of *fever*: Every four hours give a bath at 37° C. (98.6° F.) for five to ten minutes. When the patient is taken out of the bath he may be given (unless too young) a half cupful of infusion or very weak tea with a few drops of rum.

Upon Termination of the Attack.—1. Give morning and evening, in a little milk, a teaspoonful of the following solution:

℞ Potassii iodidi 0.6 gram (gr. x);
Aquæ 60 c.c. (fʒij).—S.

From 0.15 to 0.3 grams ($2\frac{1}{2}$ to 5 grains) of potassium iodide, according to age, should be given daily.

This iodide solution may be resorted to further in the interval between attacks as a fundamental therapeutic measure (*e.g.*, for the first eight days in each month).

If the child has a gastric disturbance the iodide should not be given.

2. To fluidify the bronchial secretions, one of the following combinations may be used:

℞ Syrupi senegæ	7.5 c.c. (f3ij);
Syrupi ipecacuanhæ	0.3 c.c. (m v);
Syrupi tolu	60 c.c. (f3ij).

M. Sig.: One tablespoonful morning and evening.

℞ Pulveris ipecacuanhæ et opii	0.02 gram (gr. $\frac{1}{4}$);
Lactosi	0.3 gram (gr. v).

Pone in chart. No. i. Da tal. No. x.

Sig.: One powder morning and evening in a little milk.

CONGESTION OF THE LUNGS.

It is rather difficult to give a logical, practical and comprehensive classification of the various forms of pulmonary congestion. The condition is met with, indeed, in a wide variety of clinical states, both primarily and secondarily, either following exposure to cold [primary congestion of the lungs (Woillez's disease), congestion of the pleuræ and lungs, Grancher's splenopneumonia]; in the course of diseases of the respiratory tract (tuberculosis, pneumonia, bronchopneumonia); in infectious diseases (influenza, typhoid fever, malaria), or in the presence of a cardiovascular-renal disorder (mitral disease, failing heart, uremia).

For practical purposes, consideration of the matter will be limited here to the fact that these forms of congestion may be divided into two general types, to which nearly all of them belong, irrespective of their etiology.

I. Active Congestion.—Associated with an influx of blood, an excessive activity of the pulmonary circulation. To this type belong primary congestion (Woillez's disease), pleuropulmonary congestion, peribronchial congestion, peripneumonic congestion, peribronchopneumonic congestion, perituberculous congestion, malarial congestion, gouty congestion and morbillous congestion.

The location of these hyperemic disturbances is most commonly at the apex or in the middle lobe.

They are nearly always attended with fever, and are accompanied by pronounced cardiovascular erethism.

II. Passive, Hypostatic Congestion.—Due to vasomotor paresis, cardiovascular weakness, slackened circulation, or mechanical choking-up of more or less extensive zones of lung tissue. To this type belong the lung congestion of heart cases, of the emphysematous, of renal and sclerotic cases, and most of the influenzal and typhoid congestions. It should be recognized, however, that in the last-named disorders, as in the majority of infections, the active type of hyperemia, often localized at the apex, may be observed, especially at the start.

Hypostatic congestion frequently assumes the edematous form, acute or chronic. It is nearly always located at the bases of the lungs. Unless it accompanies an infection (influenza or typhoid fever), it is not attended with fever; cardiovascular weakness is usual and vagoparesis frequent.

* * *

In **active congestion**, the main therapeutic indications—aside from the causal indications—comprise the institution of counterirritation, derivation of blood from the seat of hyperemia and combatting cardiovascular erethism.

Cutaneous derivation is secured by the various usual measures, to be graded according to the intensity of the hyperemic state: Cotton wrapped about the legs, dry or wet cupping, cold or tepid chest packs with or without mustard, mustard applications and poultices, hot baths with or without mustard. The technic of these several procedures is referred to under bronchitis and pneumonia. Even *venesection* would be indicated in the presence of very extensive hyperemia and threatening vascular erethism.

As for combatting *cardiovascular erethism*, I might repeat here precisely what was said in relation to hemoptysis in tuberculosis. A time-honored but probably irrational proceeding is to administer vasoconstrictors of the type of ergotin with the idea of causing the dilated vessels to contract; in doing this one cannot but increase the cardiovascular erethism. The present clinical tendency—which is certainly more sensible—is, as we have seen, toward the administration of vasodilators (nitroglycerin, amyl nitrite, etc.). As a matter of fact, there is one hypotensor remedy which has long since been shown to be useful in the treatment of the congestive hemoptysis of tuberculosis and which may perfectly well be used, and with good

results, in the majority of the active hyperemias, *vis.*, *ipccac* in fractional doses and its alkaloid *emetine*, one of the properties of which is precisely that of rendering the lung anemic.

The following may be prescribed:

1. \mathcal{R} Ipecacuanhæ 0.15 gram (gr. iiss);
 Quininæ dihydrochloridi,
 Extracti valerianæ 0.03 gram (gr. ss).

Ft. pil. No. i. Da tal. No. xx.

Sig.: One pill hourly with an aromatic infusion. Eight to ten pills a day.

Or:

2. Combining it with a diffusible stimulant and diaphoretic:

- \mathcal{R}
- Ipecacuanhæ 3 grams (gr. xlv);
-
- Ammonii acetatis 10 grams (5iiss);
-
- Syrupi tolu 24 c.c. (f3vj);
-
- Decocti senegæ 90 c.c. (f3ijj).

M. Sig.: One dessertspoonful hourly.

Or:

3. Combining it with a sedative and a cathartic for an intestinal derivative effect:

- \mathcal{R}
- Tincturæ opii camphorata 12 c.c. (f3ijj);
-
- Tincturæ aloes 45 c.c. (f3iiss);
-
- Syrupi ipecacuanhæ 12 c.c. (f3ijj);
-
- Syrupi senegæ 10 c.c. (f3iiss);
-
- Aquæ tiliæ (25 per cent.) 80 c.c. (f3iiss).

M. Sig.: One tablespoonful every two hours.

Dover's powder, containing 10 per cent. of ipecac. is an official preparation which is particularly serviceable in the treatment of active hyperemia of the lungs. It is sedative by virtue of its opium content and anticongestive and expectorant by reason of the ipecac.

It may be combined with quinine:

- \mathcal{R}
- Quininæ dihydrochloridi 0.1 gram (gr. iss);
-
- Pulveris ipecacuanhæ et opii 0.5 gram (gr. viiss).

Pone in cachet. No. i. Da tal. No. xii.

Sig.: Four cachets a day at four-hour intervals.

* * *

In **passive, hypostatic congestion**, the indication for *cutaneous derivation* is the same as in the preceding form and is to be met by the same measures: Dry or wet cupping, mustard applications or chest packs with or without mustard. Venesection is likewise indicated in the presence of very extensive involvement, with marked cyanosis and threatening asphyxia; it is especially imperative in cardiorenal cases. Baths, on the other hand, are much more difficult to manage and, on the whole, generally have little to recommend them.

The *cardinal indication* is that of *combating the neuro-cardiovascular weakness*.

Appropriate tonics and stimulants should be resorted to: Strychnine, digitalis, ergot, camphor in oil, caffeine, sparteine, etc.

Strychnine and ergot are more especially to be recommended in the adynamic infectious congestions of influenza and typhoid fever; digitalis, camphor in oil and sparteine, in the cardiorenal cases.

The following measures may be prescribed:

1. Camphor and ether, 10 per cent. of each in oil; 2 to 10 cubic centimeters ($\frac{1}{2}$ to $2\frac{1}{2}$ fluidrams) hypodermically in twenty-four hours.

2. \mathcal{R} Strychninæ sulphatis 0.01 gram (gr. $\frac{1}{10}$);
Aquæ destillatæ 10 c.c. (f $\frac{1}{2}$ ss).

M. Sig.: Two to four cubic centimeters ($\frac{1}{2}$ to 1 fluidram) or more a day by hypodermic injection.

3. \mathcal{R} Strychninæ sulphatis 0.001 gram (gr. $\frac{1}{100}$);
Ergotæ recentis 0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xx.

Sig.: Two to five pills a day, according to effect and tolerance.

4. \mathcal{R} Strychninæ sulphatis 0.03 gram (gr. ss);
Sparteine sulphatis 0.3 gram (gr. v);
Sodii glycerophosphatis (N. F.) 6 grams (5iss);
Extracti cinchonæ 10 grams (5iss);
Spiritus vini vitis 40 c.c. (f $\frac{1}{2}$ x);
Glycerini q. s. ad 150 c.c. (f $\frac{1}{2}$ v).

M. Sig.: Three to five teaspoonfuls in the 24 hours, in milk, coffee, or an alcoholic beverage.

5. \mathcal{R} Scillæ pulveris,

Ipomœæ,

Digitalis pulveris recentis āā 0.05 gram (gr. $\frac{3}{4}$).

Ft. pil. No. i. Da tal. No. xx.

Sig.: Four pills a day.

* * *

The following two concrete types of cases, purposely simplified, will illustrate concisely the manner in which treatment may be applied in these conditions.

Primary Congestion of the Lung (Woillez's disease).

1. Cover the chest with dry cups, morning and evening on the first day, with three wet cups over the painful point; on the following days, cup in the evening only, unless there is very marked dyspnea.

2. In the event of threatening dyspnea and very extensive congestion, withdraw about 300 cubic centimeters (10 ounces) of blood by venesection.

3. \mathcal{R} Pulveris ipecacuanhæ et opii 0.25 gram (gr. iv);
 Quinina dihydrochloridi 0.2 gram (gr. iij);
 Ipecacuanhæ pulveris 0.15 gram (gr. iiss).

Pone in cachet. No. i. Da tal. No. viii.

Sig.: Four cachets in the 24 hours.

4. A purgative enema of:

- \mathcal{R}
- Sennæ 8 grams (5ij);
-
- Sodii sulphatis 30 grams (3j);
-
- Decocti althææ 300 c.c. (f3x).

M. Sig.: To be used as enema.

5. A liquid diet: Milk, infusions, light alcoholic stimulants.

Hypostatic Congestion in Mitral Disease with Decompensation.

1. Absolute rest in bed, with the trunk elevated on pillows.
2. Dry cupping morning and evening, especially over the bases of the lungs. In the event of marked cyanosis and threatened asphyxia, venesection, 300 cubic centimeters (10 ounces).

3. \mathcal{R} Scillæ pulveris,
 Ipomœæ,
 Digitalis pulveris recentisãã 0.05 gram (gr. ¼).

Ft. pil. No. i. Da tal. No. xviii.

Sig.: Eight pills on the first day and five each on the second and third.

4. On the succeeding days:

(a) In the *morning*, an injection of 2 cubic centimeters (30 minims) of *camphor in oil*.

(b) *Morning, noon and evening*, when drinking milk, one of the following pills:

- \mathcal{R}
- Strychninæ sulphatis 0.001 gram (gr. 1/100);
-
- Sparteïnæ sulphatis 0.05 gram (gr. ¼).

Ft. pil. No. i. Da tal. No. xxx.

Sig.: Three pills a day.

* * *

Mention should here be made of **acute edema of the lungs**, so dramatic in its symptomatology (sudden, distressing dyspnea, incessant paroxysmal cough, spreading shower of fine râles) and as yet of uncertain pathogenesis.

It is met with, as is well known, under three definite clinical conditions, *viz.*, in *aortitis*, in *acute nephritis*, and in certain especially malignant forms of *influenza*. It has also been reported following removal of an excessive amount of fluid from the chest.

The **emergency treatment** for acute pulmonary edema is the removal of 300 to 600 cubic centimeters (10 to 20 ounces) of blood by venesection, sometimes repeated for two or three days; this results in actual resurrections of these cases.

If venesection were not availed of, the chest could be covered with wet cups or leeches applied.

Cardiac stimulation (camphor in oil, sparteine, hypodermic injections of oxygen gas), a milk diet, and systematic provision of fresh air complete the treatment. On the first day, at most 1200 to 1500 cubic centimeters of water should be allowed, and no food; on the succeeding days, a restricted milk diet and then a milk and vegetable diet low in chlorides.

In the acute vagoparalytic edema of influenza, *methenamine* in a daily dosage of 2 grams (30 grains), either by the mouth or by intravenous injection, is asserted to have sometimes been very effective (P. Ravaut).

The agent to be especially avoided is morphine, which is devoid of effect in these cases and particularly dangerous.

PNEUMONIA.

Pneumonia is the result of a *specific infection* (*pneumococcus of Talamon-Fränkell*) commonly involving one or more lobes of the lung (lobar pneumonia).

Clinically, pneumonia ordinarily presents a clear cut, characteristic picture. Sudden onset, sharp pain in the side, abrupt and marked rise of temperature (39.5 to 40.5° C.—103 to 105° F.); fastigial period showing a plateau at a high temperature, with dyspnea and a characteristic fibrinous and bloody sputum; abrupt defervescence on the ninth, less frequently the seventh and exceptionally the fifth day; *in short, a typical cyclic course covering seven to nine days, usually with a spontaneous tendency to recovery*—such is the ordinary clinical picture in frank acute pneumonia.

More rarely the area of hepatization suppurates, the sputum changes ("prune-juice"), the fever keeps up and presents different features (suppuration fever), and the general condition is impaired—this is the picture corresponding to *gray hepatization*. Death is possible and even frequent in such cases.

Lastly, in some instances defervescence takes place, but local resolution is slow and incomplete; the air-vesicles are not cleaned out, the air fills them only partially or not at all, and there is a tendency to *pulmonary fibrosis*.

These are the essential facts always to be kept in mind in treating acute lobar pneumonia.

While generally primary, pneumonia may sometimes develop secondarily in the course of some other general infection, usually *influenza*, sometimes *typhoid fever*, rheumatism or malaria.

The *age of the patient* (childhood, old age), *pregnancy*, *toxic or metabolic disturbances* (*alcoholism*, *nephritis*, *diabetes*) and *heart disorders* may likewise materially change the clinical form and prognosis of the condition and be the source of special therapeutic indications.

They warrant a separate section on the treatment of the different clinical forms of pneumonia.

Finally, pneumonia, while the customary localization of pneumococcic infection, may, like the majority of other infectious diseases, be complicated by para- and extra-pulmonary pneumococcic localizations, of which the commonest are pleurisy (pleuro-pneumonia), endo- and pericarditis, joint involvements, meningitis and otitis.

The general treatment of these complications of pneumonia will also be briefly considered.

* * *

The **basic precepts governing the treatment of acute lobar pneumonia** appear to me to be as follows:

1. Acute lobar pneumonia runs a course tending toward spontaneous recovery.

2. There is at present available no satisfactory specific treatment for pneumonia, nor any treatment that is certain to shorten its course.

The **main therapeutic indications** consist, therefore:

- I. In instituting general hygienic measures such as will place the system in the best possible condition for reaching the moment of spontaneous defervescence: *Hygienic treatment*.

2. Combatting by appropriate means the dominant, disturbing symptoms of the individual case, most commonly: (a) Pain; (b) hyperpyrexia; (c) dyspnea the result of widespread hyperemia; (d) sleeplessness, restlessness and delirium; (e) weakness, exhaustion, asthenia, adynamia: *Symptomatic treatment*.

3. Endeavor to foresee and forestall the two dangerous forms of resolution in pneumonia: (a) Purulent degeneration or gray hepatization; (b) fibrous infiltration or pulmonary fibrosis: *Preventive treatment against infection and fibrosis*.

PNEUMONIA IN GENERAL.—I. Hygienic Treatment.—This is the plan of treatment applicable in all acute bronchopulmonary infections.

1. *Absolute rest* in bed throughout the febrile period and even for a few days after the temperature has returned to normal.

2. *Fresh air.* The patient should be placed in an airy room, as free as possible from dust, and with protection from draughts. With the patient sufficiently covered and clothed and the room warmed if necessary, the window should be left open at least partially day and night.

3. The *diet* should be of liquid consistency and made up of foods free of purins in order to spare the liver and especially the lungs. Milk and its preparations (tea, coffee with milk), light milk soups (tapioca, vermicelli), vegetable broths, a few egg yolks if well borne, raw fruits (oranges, grapes, peaches) or cooked fruits (jellies, jams), a few dry biscuits and various beverages (water, infusions, orangeade, lemonade) should constitute the main dietary components. They should be taken in small meals at regular intervals of three hours. One to $1\frac{1}{2}$ liters of milk, $\frac{1}{2}$ liter of vegetable broth, one or two egg yolks, an orange, a bunch of grapes, five or six lumps of sugar, and 1 liter of the various beverages above referred to appear to me to make up a daily ration of choice for the pneumonic patient. Two and a half liters of fluid has seemed to me necessary as well as sufficient; below this amount, renal elimination may be inadequate; above it, there may be aqueous plethora and heart fatigue.

Alcohol has long been used in pneumonia and adynamic infectious diseases in general. I find no more satisfactory explanation of its action than that of Todd: "In pneumonia, there is formed in the air-vesicles a special exudate which soon fills them, the lung becoming a hard, firm mass. For recovery to occur, all of this exudate has to be absorbed and the air-vesicles have to return to their original condition. The processes employed by nature to bring about recovery are very complex, and no one will maintain that we possess any drug that is capable, through a direct action on the organism, of causing this recovery.

"In the prosecution of these changes, a considerable expenditure of nervous energy and of blood is made; accordingly, we must supply to the system a kind of food which, while readily absorbed, is at the same time capable of sustaining nervous strength and maintaining body heat. Alcohol is this food; it is absorbed by a mere process of endosmosis; it exerts a special influence on the nutrition of the nervous system, and by combining with the oxygen in the body it supplies fuel for maintaining the body temperature."

Alcohol exerts a sparing effect on the protein substances. It enables one to reduce the diet to a minimum; it permits of pursuing a waiting policy ("*aliment d'attente*").

Under such circumstances I agree thoroughly, however, with Todd, Béhier and Talamon that if a really useful effect is to be obtained, alcohol must be given in alimentary doses (under such circumstances, I repeat), *i.e.*, to the amount of at least 100 cubic centimeters (3½ ounces) of rum or brandy in the twenty-four hours; and as a continuous stimulation is desired in these cases, it should be given in fractional amounts every two hours, *e.g.*:

℞ Tincturæ cinnamomi	6 c.c. (f5iss);
Spiritus jamaicensis	100 c.c. (f3iiiss);
Syrupi	75 c.c. (f3iiss);
Aquæ tilisæ	40 c.c. (f5x).

M. Sig.: One tablespoonful every two hours.

4. *A fundamental hydrotherapeutic measure*, which may be recommended in all pneumonias, is the *chest pack*. The chest is wrapped about with a towel moistened with tepid or cold water (30 to 22° C.—86 to 71.6° F.), covered with oiled silk and held in place by a dry towel passed around it and held up by shoulder straps. The pack should be allowed to remain for twenty minutes to one hour, and should be repeated, according to needs, three to six times in the twenty-four hours. Such packs alleviate the cough, relieve the local pain, reduce the dyspnea, facilitate expectoration, improve and stimulate pulmonary circulation, and cause contraction of the muscles of Reissessen.

5. *Vaporisation and spraying* about the patient of aromatic substances (oil of turpentine, creosote, eucalyptus, compound preparations) and the *moderate*, continuous liberation of formaldehyde gas from special generators are measures that may be recommended (see *Acute and Chronic Bronchitis*).

6. *Careful daily toilet of the mouth and teeth* is of particular service in these cases. The hands must be kept clean.

II. **Symptomatic Treatment.**—1. The *initial pain in the chest*, sometimes exceedingly severe, should be treated by moist chest packs. If it persists or is really intolerable, there should be no hesitation in applying from *three to six wet cups* over the affected area and even giving a hypodermic injection of 0.01 gram (⅙ grain) of *morphine*.

2. *Fever* should be opposed when it exceeds 40° C. (104° F.). Recourse should be had to *hydrotherapeutic measures*; the chest packs should be ordered given cold (20 to 22° C.—68 to 71.6° F.) and more frequently renewed. If they prove insufficient, *tepid baths* (32° C.—89.6° F.), should be prescribed, with the temperature *progressively lowered* to 26° C. (78.8° F.), these baths to be of *ten to fifteen minutes' duration*, and repeated three or four times a day. They exert their customary antipyretic, diuretic, tonic and sedative effects; hyperpyrexia cases are often excited. It is best to

abstain from these baths in aged persons, nervous and impressionable subjects, and especially, in heart cases. On the other hand, in robust adults or adolescents one may, if hyperpyrexia is obstinate, resort to cold baths (22 to 25° C.—71.6 to 77° F.).

Attempts have been made to set up this procedure as a systematic treatment for pneumonia. This would obviously be going too far. The baths may be employed with advantage mainly in cases with high fever and restlessness; in the other cases, they are often useless and sometimes dangerous. *Precordial application of cold* could also be tried.

The antipyretic drugs are generally ineffective, devoid of utility and even dangerous. One might, at most, permit the use of a few doses of a mixture in equal parts of quinine and antipyrin, with caffeine added as a corrective of the neurovascular depressant effect:

R. Caffeinæ 0.05 gram (gr. $\frac{3}{4}$);
 Antipyrinæ,
 Quininæ dihydrochloridi 0.5 gram (gr. viiss).
 Ft. cachet. No. i. Da tal. No. vi.
 Sig.: One cachet a day.

Quinine in repeated massive doses is considered in America as specifically toxic to the pneumococcus.

Ethylhydrocupreine has been advocated in America and in Germany in an average dosage of 0.2 gram (3 grains) four to six times a day. The cases and statistics published in this connection are not very demonstrative. The same applies to sodium citrate in large doses—1 gram (15 grains) hourly in large amounts of fluid—as recommended by some Americans. We recommend it in more moderate dosage: 1 to 3 grams (15 to 45 grains) a day.

3. If the *hypercemia is very widespread* and pulmonary engorgement intense, there may be severe dyspnea with a tendency to cyanosis which urgently demands treatment. Early and systematic chest packs will ordinarily prevent such engorgement; if it develops, *repeated dry cupping* (20 to 30 cups), *wet cupping* (8 to 10 cups) and *mustard packs* should be resorted to.

If the dyspnea becomes threatening, with a tendency to cyanosis, mechanical disturbances of the pulmonary circulation with edema, and manifestations of cerebral stasis, *venesection* (200 to 300 cubic centimeters—6 to 9 ounces) should be carried out. This measure, as is well known, was formerly set up as a routine treatment for pneumonia; at present, the indications for it are regarded as practically limited to the condition already mentioned, but in such cases it retains all of its therapeutic value, as it does likewise in acute edema of the lungs.

4. In the presence of *sleeplessness, restlessness, or delirium*, tepid baths (33 to 30° C.—91.4 to 86° F.) and cold applications to the head are of great service.

If these symptoms are pronounced, sedatives or hypnotics should be given: Chloral hydrate, bromides, morphine, barbitol, etc.

5. If *adynamia* is the predominating symptom, and *heart weakness* is feared, strychnine and digitalis should be used. *Strychnine* may be given by hypodermic injection in a dose of 0.001 to 0.002 gram ($\frac{1}{65}$ to $\frac{1}{32}$ grain) or in a liquid alcoholic preparation with or without addition of cinchona:

R Strychninae sulphatis	0.03	gram (gr. ss);
Extracti cinchonae	10	grams (3iiss);
Spiritus vini vitis	60	c.c. (f3ij);
Glycerini .....q. s. ad	150	c.c. (f3v).

M. Sig.: Three to five teaspoonfuls in the 24 hours.

It seems rational to administer *digitalis* almost continuously from the fourth to the seventh day of pneumonia in order to sustain and tone up the heart during the period of defervescence, which is sometimes that of heart weakening. When the diastolic pressure falls below 60 mm. Hg, it is well to increase the dose of digitalis, or even to give a hypodermic injection.

Tincture of digitalis to the amount of 2 cubic centimeters (32 minims) may be ordered taken in one day; it may, if desired, be mixed with some alcoholic stimulant preparation.

Recourse may also be had to injections of *camphor in oil* or to a combination of *strychnine and sparteine*. *Caffeine* is hardly to be recommended, as its action is fugacious and the nervous excitement it causes is often unpleasant. Camphor in oil may be used freely. In aged subjects, in whom *adynamia* is the rule, massive injections of it may be given, *e.g.*, three or four injections of 5 cubic centimeters (80 minims) of 20 per cent. camphor in oil in the twenty-four hours.

6. As a rule, *expectorants* are superfluous; yet, if the sputum is very viscid, *ammonium chloride* may be prescribed to the amount of 4 grams (1 dram) a day in a liquid preparation. *Syrup of ipecac, anisated spirit of ammonia* and Dover's powder may also be recommended.

7. The breathing of *oxygen* is manifestly beneficial to pneumonia patients. It acts favorably in combating anoxemia. I have had occasion to witness its good effects in all its forms, *viz.*, by ordinary inhalation, by intensive inhalation (emptying a tank of oxygen in the patient's room) and by hypodermic injection. The measure has been systematized by W. C. Stadie, who has had constructed at the Rockefeller Hospital an oxygenation chamber in which the pneumonia patient and a nurse

may easily remain for a period deemed suitable while breathing an atmosphere containing from 40 to 60 per cent. of oxygen. Final judgment on this procedure cannot yet be given.

8. Defervescence having occurred, pneumonia often leaves behind it areas of lung tissue that functionate poorly and in which the air-vesicles are not satisfactorily opened up. Systematic *breathing exercises*, by restoring complete expansion of the lung, will prevent the development in it of permanent chronic fibrosis.

III. **Anti-Infectious Treatment.**—Pneumonia is one of those diseases concerning which it seems physicians have never been willing to appear destitute of curative measures. Indeed, in every by-gone period, some routine method has been adopted to which have been wrongly ascribed the recoveries witnessed, generally in spite of the method and solely through the spontaneous course of the disease. Blood-letting, tartar emetic and blistering have been touted one after another; time has passed judgment on these procedures, which may be said to have left nothing but unpleasant recollections. Our own age is that of the *serums* and *vaccines*. Many have been tried. Of diphtheria antitoxin (Talamon), of physiologic salt solution, of the antipneumonia serums of Klemperer, Foa, Carbone and Scabia, Römer, and the Institut Pasteur, it may be said that, like the remedial measures previously mentioned, they have not as yet given plainly favorable clinical results. The same is true of the *vaccines*. At any rate, the actual, effective value of vaccine therapy and of serum therapy in pneumonia remains doubtful. These methods are really both as yet in the experimental stage.

The same considerations apply to the attempts at pneumonia treatment by injections of blood-serum or transfusion of blood from convalescent pneumonia and influenza patients (Ross and Hand).

I have carefully collected the accounts and statistics of the cases treated in France and in America by a wide variety of antipneumococcus serums. The most favorable observations and brilliant statistics (some are woefully poor) have not seemed to me to differ in any respect from those relating to pneumonia cases properly treated by the classic measures.

[In the United States, prevailing opinion is more favorable toward an actual curative value on the part of serum for the Type I pneumococcus than one would gather from the above statements. This is one form of serum, at least, in which the view of the majority of clinicians has recognized the possibility of some specific action. Type I antipneumococcus serum has been widely considered of benefit in pneumococcus Type I pneumonia when it is given early in the disease and in large doses. A modified antipneumococcus serum

known as pneumococcus antibody solution, which is polyvalent and is featured by the marked chill and high fever following its intravenous injection, has been used more recently with apparently favorable results, especially in Type I cases.—Tr.]

The antipneumococcus serum of Truche (Institut Pasteur) is injected intramuscularly or subcutaneously—40 to 80 cubic centimeters in adults, 10 to 20 cubic centimeters in children, and 10 cubic centimeters in nurslings.

The Institut Pasteur delivers antipneumococcus serums of Types I, II, III and IV, according to the pneumococcus responsible in the individual case, and also polyvalent serums. Improvement is manifested to a greater extent as to the general condition of the patient than as to the physical signs.

D'Oelsnitz and Colle, and Sacquépée have combined serum therapy with vaccine therapy.

Intramuscular injection is the preferable mode of administration. The intravenous route may be attended by severe shock phenomena. The intratracheal route is really distressing to the patient.

One form of *anti-infectious medication* which is sanctioned on the basis of observed facts and has been acknowledged as having some value is *colloid therapy*, i.e., treatment with colloidal metals.

Yet it must be acknowledged—and this is manifestly the disappointing feature of this treatment, as well as of those previously referred to and, in general, of any treatment operating by “shock”—that the results are not absolutely constant, and that after witnessing an almost miraculous effect one will have to record failure in a similar case, apparently treated in identically the same way. It seems that there is often advantage, especially among the debilitated and in the grave cases, in applying it systematically for the first three or five days of pneumonia in the form either of *prolonged rubs*, for twenty or thirty minutes, of 3 to 5 grams (45 to 75 grains) of 15 per cent. collargol ointment, or of *subcutaneous* or *intramuscular*, or even intravenous, *injections* of 10 cubic centimeters (160 minims) of electargol or of sterilized 2 per cent. collargol solution. Under this treatment I have observed a definitely increased ratio of cases of defervescence on the fifth and even the third day of the disease.

OUTLINES OF TREATMENT.

Following, by way of summarization of the foregoing data, are a few typical outlines of the treatment applicable to different clinical forms of acute lobar pneumonia in adults.

Acute Lobar Pneumonia of Intermediate Severity.**I.—The First Seven or Nine Days.****A.—HYGIENIC MEASURES.**

(a) *Rest in bed in a well aired room with the window open, the patient being carefully protected from draughts.*

(b) *Four to six times a day, a moist chest pack, as already described, for one hour's time.*

(c) *Liquid diet:* Milk, broth, fruits, weak alcoholic preparations, in small divided amounts at regular intervals.

(d) *See that there are regular bowel movements.* Initial purgation, preferably with:

℞ Hydrargyri chloridi mitis 0.6 gram (gr. x);
Lactosi 4 grams (3j).

Div. in chart. No. ii.

Sig.: To be taken ten minutes apart in a little sweetened water.

(e) *Careful washing of the mouth and hands after each meal.*

Daily toilet of the skin.

(f) *To be freely volatilized in the room:* Oil of turpentine, eucalyptus, creosote.

B.—MEDICINAL TREATMENT.

(a) *Injections of 10 cubic centimeters (160 minims) of a solution of colloidal silver on the first, third, fifth and seventh days.*

(b) ℞ Quininae dihydrochloridi,
Antipyrinae āā 0.3 gram (gr. v).

Pone in cachet. No. i. Da tal. No. viii.

Sig.: One cachet at 1 P.M.

(c) *Tincture of digitalis, 2 cubic centimeters (32 minims) in twenty-four hours in three-hourly divided amounts, beginning on the fourth or fifth day. It may be given thus:*

℞ Tincturae digitalis 2 c.c. (m_{xxxij});
Spiritus frumenti 30 c.c. (f3j);
Syrupi 20 c.c. (f3v);
Tincturae cinnamomi 4 c.c. (f3j);
Aqua destillata 60 c.c. (f3ij).

M. Sig.: One tablespoonful every three hours, beginning on the fourth or fifth day.

II.—After the Crisis.**A.—HYGIENIC MEASURES.**

(a) *Patient to leave the bed by degrees.*

(b) *Chest rubs with Rosen's liniment:*

℞ Olei myristicæ expressi,
 Olei caryophylli āā 5 c.c. (℥lxxv);
 Spiritus juniperi 80 c.c. (f3iiss).—M.

(c) *Systematic breathing exercises; later, altitude cure.*

(d) *A generous, progressively increased, mixed diet:*

Vegetable soups, with a poached egg or meat juice prepared with chicken or beef broth. Broiled or roast meats, fish, fowl. Eggs. Purées of dried vegetables, potatoes, rice, macaroni, etc. Fruits, cooked and raw. Fresh, fat cheeses. Dry biscuits.

B.—MEDICINAL TREATMENT.

℞ Tincturæ ignatiæ (N. F.) 2 c.c. (℥xxx);
 Sodii arsenatis 0.1 gram (gr. iss);
 Sodii glycerophosphatis 4 grams (5j);
 Vini gentianæ (3 per cent.),
 Vini cinchonæ (5 per cent.) āā 250 c.c. (f3viiiiss).

M. Sig.: Two tablespoonfuls at each of the larger meals.

CLINICAL VARIETIES OF PNEUMONIA.

Severe Acute Lobar Pneumonia, with sharp initial pain, high fever, marked circulatory erethism, intense dyspnea, restlessness, delirium.

(a) Six to ten wet cups over the seat of pain, and twenty dry cups over the remainder of the chest. Repeat the dry cups each day, and the wet cups according to indications. Add venesection, 300 cubic centimeters (10 ounces), if necessary.

(b) Cold applied to the head and precordium.

(c) A liquid diet made up exclusively of milk and milk preparations, fruits, infusions, and diluted wine, in small divided amounts at two hour intervals.

(d) Careful toilet of the mouth, hands and body.

(e) Aromatic vaporizations: Eucalyptus, benzoin, turpentine.

(f) Give:

℞ Tincturæ jalapæ compositæ (N. F.),
 Syrupi rhamni cathartici (N. F.) āā 15 c.c. (f3ss).—M.

(g) ℞ Sodii bromidi 10 grams (3iiss);
 Syrupi chloratis hydratis (5 per cent.),
 Syrupi morphinæ (0.05 per cent.) āā 75 c.c. (f3iiss).

M. Sig.: Three or four tablespoonfuls for restlessness and sleeplessness.

(h) Daily injections of 10 cubic centimeters (160 minims) of elcc-trargol.

Acute Lobar Pneumonia, with a tendency to adynamia and heart weakness.

A.—HYGIENIC MEASURES.

See the first Outline, Section I.

B.—MEDICINAL MEASURES.

(a) Give *morning* and *evening* an injection of 1 cubic centimeter (16 minims) of:

℞ Strychninæ sulphatis	0.02 gram (gr. $\frac{1}{8}$);
Aquæ destillatæ	10 c.c. (f $\overline{3}$ iiss).—S.

(b) ℞ Solutionis digitalini cristallisati (French, 1:1000)	1 c.c. (m̄xvj);
Tincturæ cinnamomi	4 c.c. (f $\overline{5}$ j);
Spiritus jamaicensis	100 c.c. (f $\overline{3}$ iiss);
Syrupi	75 c.c. (f $\overline{3}$ iiss);
Aquæ tiliæ	40 c.c. (f $\overline{5}$ x).

M. Sig.: One tablespoonful every two hours, in alternation with the meals.

(c) ℞ Quinina dihydrochloridi	0.4 gram (gr. vj).
Pone in caps. No. i. Da tal. No. viii.	
Sig.: One capsule at 3 p.m.	

(d) A daily injection of 5 cubic centimeters (80 minims) of electrargol.

Lobar Pneumonia in Children.—This is less common (especially in early childhood) and less serious than bronchopneumonia. As a rule, recovery occurs without active treatment, merely under hygienic measures.

PNEUMONIA IN LATER CHILDHOOD.

1. *At the onset and in the fastigial period:*

(a) If the initial pain is severe, two to four wet cups.

(b) If there is high fever, excitement, restlessness and sleeplessness, a cold chest compress should be applied every two hours and two or three ten-minute tepid baths (34 to 32° C.—93.2 to 89.6° F.) given in the course of the twenty-four hours.

(c) If, on the other hand, there is a tendency to collapse or adynamia, alcohol should be prescribed in the form of brandy (15 to 30 cubic centimeters—1 ounce—a day in a sweetened liquid preparation); likewise black coffee, stimulating rubs, and injections of camphor in oil and digitalis.

℞ Tincturæ cinnamomi	2 c.c. (m̄xxxij);
Tincturæ digitalis	gtt. xij;
Spiritus vini vitis	30 c.c. (f $\overline{5}$ j);
Syrupi cinchonæ	22 c.c. (f $\overline{5}$ vss);
Infusi salviæ	100 c.c. (f $\overline{3}$ iiss).

M. Sig.: To be taken in 24 hours.

(d) If there is profound infection, twice daily rubs of 15 per cent. colloidal silver ointment.

2. During convalescence:

(a) Stimulating chest rubs with Rosen's liniment (see page 1276) or other analogous preparations, cauterizations or small fly blisters (Le Gendre) if evidences of vesicular obstruction persist.

(b) A stay in the country, mountains or at the seashore will accelerate convalescence.

(c) A substantial diet, with iodotannic preparations, cinchona, arsenic and codliver oil.

Pneumonia in the Aged.—In the aged, the ever-present threat of neurocardiac weakness and collapse is the source of three main practical indications:

1. The *necessity of early use of the heart stimulants and tonics*: Alcohol, digitalis, caffeine, strychnine and diffusible stimulants, as in the following formula:

R. Strychninæ sulphatis	0.003 gram	(gr. $\frac{1}{20}$);
Tincturæ digitalis	2	c.c. (m xxxij);
Ammonii acetatis	4	grams (3j);
Spiritus vini vitis,		
Syrupi	āā 45	c.c. (f℥iss);
Aquæ tiliaë	60	c.c. (f℥ij).

M. Sig.: One tablespoonful every two hours for the first three days (prescription for one day only).

On the subsequent days, replace by caffeine:

R. Caffeinæ	0.5 gram	(gr. viiss);
Sodii benzoatis	4	grams (3j);
Spiritus vini vitis	40	c.c. (f℥x);
Syrupi cinchonæ,		
Syrupi	āā 22	c.c. (f℥vss);
Aquæ tiliaë	50	c.c. (f℥iss).

M. Sig.: Take in tablespoonful doses in the course of the 24 hours.

If necessary, concurrent use should be made of injections of full amounts (5 cubic centimeters—80 minims) of camphor in oil, given three to five times a day.

2. Be cautious as regards *withdrawal of blood*; order at most two or three wet cups in the event of very severe pain (which is exceptional).

Abstain from cold hydrotherapy, which is attended with danger in the aged.

3. Avoid *narcotics* (opium, chloral hydrate) as much as possible; at most, in the event of excitement, use calmatives (valerian, orange flowers, etc.).

Pneumonia in Alcoholics.—This condition yields two main imperative prophylactic indications, corresponding to the two chief dangers entailed, *vis.*, *delirium tremens* and *heart collapse*.

To forestall the first of these complications, alcohol and morphine in large doses should be prescribed:

R Syrapi morphinæ (0.05 per cent.) 37.5 c.c. (f3x);
 Spiritus vini vitis,
 Aquæ āā 100 c.c. (f3iiiss).

M. Sig.: To be used as required in the course of a day, in tablespoonful hourly doses, until sleep or drowsiness comes on.

For the prevention of cardiac asthenia, intermittent *precordial cold applications* and *hypodermic injections of strychnine* (0.002 to 0.004 gram— $\frac{1}{30}$ to $\frac{1}{15}$ grain—or more in the 24 hours) and of *camphor in oil* should be used.

Influenzal Pneumonia.—The chief clinical feature of influenzal pneumonia is *neurocardiac asthenia* with a tendency to stasis in the lungs, paresis of the bronchi and weakening of the heart.

The risks entailed relate to the heart and the nervous system.

There are three main indications:

1. To treat the threatening symptom by neurocardiac stimulation.
2. To treat the local disease by decongesting the lung.
3. To treat the causal infection by anti-infectious measures.

1. *Cardiac stimulant medication:*

The best heart-tonic is *digitalis* and the best nervine tonic, *strychnine*. One might prescribe:

(a) Solution of crystallized digitalin (French; 1:1000), 30 drops in two doses on the first day and 20 drops on the second day [equivalent to 0.6 and 0.4 gram (9 and 6 grains) of digitalis leaf].

No heart-tonic should be given on the succeeding days unless specially indicated.

(b) R Strychninæ sulphatis 0.01 gram (gr. $\frac{1}{60}$);
 Aquæ destillatæ 10 c.c. (f3iiss).

M. Sig.: One to 3 cubic centimeters (16 to 48 minims) or more hypodermically in the 24 hours.

Or, two to four granules of 0.001 gram ($\frac{1}{65}$ grain) of strychnine sulphate may be substituted.

2. *Decongestive and expectorant medication:*

(a) *Dry cups* and *mustard poultices*, acting by derivation and by reflex stimulation.

(b) R Sodii benzoatis 10 grams (3iiss);
 Tincturæ senegæ (20 per cent.) 10 c.c. (f3iiss);
 Syrapi codeinæ (N. F. IV) 30 c.c. (f3j);
 Syrapi tolu 120 c.c. (f3iv).

M. Sig.: Three tablespoonfuls in the 24 hours.

3. *Anti-infectious medication:*

(a) By general antiseptis: Collargol inunctions; polyvalent serum (?)

- (b) By intestinal antiseptics: Milk diet, purgation, calomel.
- (c) By antiseptics of the mouth, nose and pharynx.

PLEURISY.

(Written with the collaboration of A. LUTIER, M.D.)

Cases of pleurisy may be classified, according to the nature of the effusion, into the dry, serofibrinous, hemorrhagic and purulent forms.

* * *

DRY PLEURISY.—Dry pleurisy [pleuritis sicca] either merely precedes pleurisy with effusion or remains continuously. In either instance, the patient must go to bed and be kept under very close observation by the physician. The temperature should be carefully taken and the patient not allowed up until about ten days have elapsed since the return of the temperature to normal.

The general management, feeding and measures to be used during convalescence are the same as those to be described later on for the tuberculous form of sero-fibrinous pleurisy.

The *initial pain* should be relieved more particularly by counterirritation. Sodium salicylate may be given in a dosage of 3 to 5 grams (45 to 75 grains) a day in adults. An injection of morphine should be administered if required.

Cough should be combatted with sedatives (opiates, aconite).

Potassium iodide has been recommended, especially during convalescence.

Counterirritation is the fundamental measure in the treatment. It reduces the pleural inflammation and, in particular, relieves the pain. One of the following revulsive measures should be employed:

Dry cups, especially useful when the pleurisy is accompanied by intense pulmonary congestion. They are often inadequate, however, to relieve the initial pain in the side. Two or three wet cups should then be applied at the base of the chest on the affected side.

Cauterizations are effective in dispelling the pain.

Applications of *tincture of iodine*, or better, of tincture of iodine with addition of 10 per cent. of *guaiacol*, which is more strongly analgesic, may be availed of.

The efficacy of *blistering* in causing absorption of an effusion has never been demonstrated; on the other hand, the procedure exposes the patient to local and general risks. It should be employed, there-

fore, only with great circumspection. A small blister or fly blisters are, however, sometimes effective.

The *moist chest pack* is of the greatest service in the alleviation of the pain and concomitant pulmonary congestion.

* * *

SEROFIBRINOUS PLEURISY.—Serofibrinous pleurisy is, as is well known, ordinarily the expression of an attenuated *tuberculosis of the pleura*, but may also be met with, though less frequently, in connection with *acute rheumatism, congestion of the lungs, pneumonia, influenza, typhoid fever, heart disorders, nephritis and syphilis*. The ordinary serofibrinous pleurisy, usually of tuberculous origin, is but little modified in its course by active treatment. It generally progresses to recovery in three or four weeks, unless there be complications.

The routine general treatment resolves itself into the following measures:

1. *Absolute rest in bed* throughout the febrile period and for about five days after the temperature has returned to normal.
2. *Aëration*, and even systematic *superaëration*, as in any other tuberculous condition.
3. A *diet* at first exclusively of milk, then of milk and vegetables, then of milk, eggs and vegetables, chloride-free, as defervescence gradually takes place.

Purgative, diuretic and diaphoretic measures, aside from any causal or symptomatic indications, do not seem to exert an appreciable direct action on the rapidity of absorption of the effusion. They may, however, be resorted to, without undue expectations.

The question of the employment of *blistering* seems to have been about generally settled, in Paris at least, in the negative. The school of Montpellier, however, has remained faithful to it: Prof. Grasset advocates blistering on the seventh day if an effusion of small size is showing no tendency toward resolution.

Special Treatment.—This is governed by the nature of the disturbance.

(a) *Tuberculous pleurisy* requires the well-known systematic hygienic treatment, to be described in the section on *Pulmonary Tuberculosis*.

(b) *Rheumatic pleurisy*, which is rather common, movable and of small extent, demands the proper administration of a salicyl preparation (sodium salicylate, acetylsalicylic acid, etc.).

(c) The *pleurisy accompanying congestion of the lungs and pneumonia* entails like indications: Cupping, heart-tonics, alcohol, etc.

(d) *Typhoid pleurisy* contraindicates the use of cold baths. Cold enemata, cold sponging and quinine should be substituted.

(e) *The pleurisy of heart cases* should be treated with digitalis, sparteine, strophanthus and theobromine, which, however, will often be effective only after paracentesis, which should be carried out slowly and very cautiously for fear of syncope.

(f) *The pleurisy of nephritic cases* indicates the milk and chloride-free diets, wet cups over the lumbar regions, caffeine and theobromine.

(g) *Syphilitic pleurisy* should be treated with mercury and iodides.

TUBERCULOUS SEROFIBRINOUS PLEURISY.

A.—ACUTE STAGE.

General Treatment.—1. The patient is to be *kept in bed*, motionless, and with the head slightly raised on pillows. He should be instructed to move about as little as possible, lest syncope occur.

2. The *room* should be freely aired, with a temperature of 18° C. (65° F.); dust and draughts to be avoided.

3. *Diet.* This should be based on *milk*, which is diuretic and sufficient for those who bear it well. The diet may, however, be varied with milk soups or vegetable broths, gruels, eggs beaten in milk, rice, puddings, baked custards and fruit compotes. There is no advantage in giving cooked or raw meat in this stage; it upsets the digestive tract, the fever rises and the patient's strength is not improved by it.

A *chloride-free* diet is to be recommended.

4. *Hygiene of the mouth* should be carefully seen to: Frequent mouth-washing with alkaline water.

5. *Regular bowel movements* should be secured, laxatives or enemata being used if required. A. Robin recommends calomel to the amount of 0.4 gram (6 grains), to be divided into four powders, taken hourly.

6. *Take measures to induce a satisfactory diuresis.* In the majority of cases, in spite of all, diuresis does not occur, or when it appears, is evanescent and does not seem to hasten absorption of the effusion. The patient may, however, be made to drink each day a bottle of mineral water of the type of Évian, with addition of 60 to 100 grams (2 to 3½ ounces) of lactose.

7. *Relieve the unpleasant symptoms* complained of by the patient:

For *fever* prescribe particularly *sodium salicylate*; this relieves the pain in the side, but there is no evidence that it contributes to the absorp-

tion of the effusion. At all events, it has less in the way of drawbacks and more advantages than the other antipyretics. It may be prescribed in a daily amount of 2 or 3 grams (30 to 45 grains) in a liquid preparation, taken with a little Vichy water.

The *pain in the side* and *dyspnea* should be alleviated by the revulsive measures already referred to under *Dry Pleurisy*. If necessary, an injection of morphine or diacetylmorphine may be given.

Dry, paroxysmal cough may be allayed with opiates, bromoform or aconite.

Local Treatment.—Paracentesis Thoracis.—What are the *indications* for paracentesis?

Throughout the period of formation of the effusion, paracentesis offers no advantages. As long as the inflammation has not subsided, the fluid reforms if removed by paracentesis, and perhaps it performs some useful rôle by preventing adhesion of the two layers of the pleura and by affording an opportunity to the defensive processes to become organized in a normal way. It has been asserted that the pleural fluid contains substances which immunize the system. The pleura being a permeable membrane, as may be seen by injecting methylene blue into the pleural cavity and observing its elimination in the urine, it may be concluded that the immunizing substances which are formed in the pleural disease focus are actually absorbed through the pleural walls and pass into the blood circulation.

Accordingly, except in the urgent cases in which the effusion is attended with danger on account of its great extent, one should take care not to puncture during the febrile stage, in which the effusion is increasing, and reserve it for the stage of decline, in which it permits of completing the cure, if the latter is too long delayed.

1. **EMERGENCY PARACENTESIS.**—The need for paracentesis is urgent when the effusion, by reason of its large extent and, especially, its duration, in the left pleura, exposes the patient to sudden death by collapse. Any effusion which is suspected to exceed 1½ liters should be evacuated.

How is one to Estimate the Amount of Fluid?—The clinical dicta of Dieulafoy may be recalled in this connection: "As regards *left-sided pleurisy*: When the flatness and absence of fremitus extend posteriorly up to the spine of the scapula; when the resonance of Traube's space has disappeared; when, in the clavicular region, Skoda's resonance has been replaced by dullness, and especially, when the heart is displaced to the extent that the systolic sound is heard loudest at the right border of the sternum or between the sternum and the right

breast, even though at this time the pleural cavity is not completely filled, such signs in an adult indicate that the effusion has almost or quite reached 2 liters." In the case of *right-sided pleurisy*, an estimate is more difficult to make, but it may be put down that when the flatness and absence of fremitus extend posteriorly up to the spine of the scapula; when Skoda's resonance below the clavicle is replaced by dullness, and especially, if the liver is pushed down, paracentesis is imperative.

Paracentesis is likewise necessary, even with a small effusion, if dyspnea should become threatening on account of a lung disturbance on the opposite side (emphysema, pneumonia, pneumothorax) or a heart disorder.

How much Fluid Shall be Withdrawn?—As a rule, not over 1 liter of fluid should be removed. But no rule is without its exceptions, and under careful supervision, in a subject with a robust heart, this limit may be exceeded.

If the effusion is very extensive, exceeding 2 or 3 liters, another liter of fluid is to be withdrawn on the next day or the day after that, and this procedure repeated until the effusion is exhausted; or, by combining injection of air into the pleura, all of the effusion may be withdrawn at one sitting.

2. **USEFUL PARACENTESIS.**—When a pleural effusion of intermediate amount, or even of small amount, exhibits delayed absorption; when, after three or four weeks, it is seen to remain at a stationary level, the fever having subsided, paracentesis is indicated. In these cases there are present, indeed, thick pseudo-membranes which are preventing absorption, and at the same time binding down and immobilizing the lung. There is no advantage in waiting; the fluid must be withdrawn in order to allow the lung to expand and resume its position in the pleural cavity.

In secondary pleuro-tuberculosis, *i.e.*, in the cases in which the patient already has pulmonary tuberculosis, there is advantage in postponing paracentesis as long as possible, as the fluid, by compressing the lung, seems to delay progression of the tuberculous process in it.

Blocked Pleurisy.—Evacuation of acute blocked pleurisy is unnecessary, as the fluid reforms very rapidly. But in chronic blocked pleurisy, evacuation should be as rapid and as complete as possible, to avoid purulent transformation. To evacuate these blocked pleurisies, the pleura is penetrated with a first needle, then another puncture with a second needle. The air entering the pleural cavity through the first needle allows the fluid to issue through the second.

Air can, moreover, be injected through the first needle.

Bilateral Pleurisy.—Paracentesis should be carried out earlier than in unilateral pleurisy, and the left pleura should be dealt with first.

Injections of Gas into the Pleural Cavity.—Oxygen, which is rather rapidly absorbed, may be injected. Since a long time, injection of nitrogen has been recommended; nitrogen is an inert gas which is not absorbed as rapidly as oxygen and which is still found in the pleura seven or eight months later. More simply, air may be injected. Air is absorbed less rapidly than oxygen, but more rapidly than nitrogen; six weeks after injection of $\frac{1}{2}$ liter of air, some of it is still seen in the chest under fluoroscopy. A number of observers, especially P. Emile Weil, have recently been teaching that paracentesis combined with artificial pneumothorax is the best treatment for serofibrinous pleurisy. The amount of gas to be injected is one-half of the amount of fluid withdrawn.

Introduction of air into the pleural cavity:

1. Permits of the evacuation of blocked effusions.
2. Obviates accidents in paracentesis due to too rapid decompression of the lungs, and consequently permits of evacuation of the whole of extensive effusions. It restores the normal equilibrium of the heart and other thoracic organs, chest walls and diaphragm.
3. Prevents reformation in recurring pleurisy.
4. Antagonizes the progression of tuberculosis in the lung.
5. In particular, prevents the formation of adhesions; in short, brings about a complete cure of pleurisy (Weil).

Autoserotherapy.—This treatment was devised by Gilbert, of Geneva. It consists in puncturing the pleura, withdrawing 2 or 3 cubic centimeters (30 to 45 minims) of the pleural fluid and, without taking out the needle entirely, reinjecting this fluid under the skin.

The value of autoserotherapy remains open to serious question. Jousset, indeed, deems it dangerous and illogical. Thus far, it has seemed to me harmless but ineffective.

Antituberculous Serum Therapy.—Jousset's antituberculous serum therapy seems especially indicated in the acute forms with high fever and extensive effusion. As a matter of fact, I witnessed, with Jousset and Pal, a particularly impressive case in which the disease was completely and rapidly checked by two injections of antituberculous serum (120 and 80 cubic centimeters) given ten days apart: The temperature dropped in a few days from 39-40° C. (102-104° F.) to 36.8-37.2° C. (98.2-99° F.), while the effusion, which had reached the right scapular spine, was undergoing partial absorption, concurrently with pronounced improvement in the general condition.

B.—POST-PLEURITIC STAGE.

The after-results of pleurisy, the thickening of the pleural serous membrane, must be caused gradually to disappear, and the lung made to regain its elasticity.

Cauterizations.—Repeated treatments.

Fresh Air Treatment.—The period of convalescence should be spent in a district in which the air is pure, preferably in a resort at an intermediate or high elevation. Patients for whom altitude is not desirable should spend a season on the Southern seacoast, and if it is the winter season, in a sheltered locality. If such climatic resorts are unavailable, the patient should spend a while in the country, in a dry locality. He should lie outdoors on a steamer chair in the daytime and have the window open at night.

Dust and tobacco are to be shunned.

Overfeeding.—Only a moderate degree of overfeeding is indicated.

Broiled or roast meats, eggs, dry vegetables, cereals, milk preparations.

To these should be added raw meat (proteins), raw egg yolks (lecithin), cereal decoctions (natural phosphates), malt extracts (phosphates and digestive ferments) and codliver oil (a sparing food + vitamins).

Kinesitherapy.—(a) *Walking.*—This should be carried out progressively, in the open air, on level ground, and later on rising ground. The patient's temperature should be taken at the conclusion of the walk. If it has risen more than 0.5° C. (0.9° F.) above the normal, walks should be discontinued. Breathlessness and dyspnea are to be avoided, as the heart of convalescents from pleurisy is quick to weaken.

(b) *Respiratory Exercises.*—These should be carried out cautiously, for sometimes the earlier séances result in a rise of temperature.

Drugs.—Arsenic in the form of sodium arsenate, sodium cacodylate or sodium methylarsenate. Iodine in the form of sodium iodide, or better, of the various organic iodine preparations (iodopeptonates, iodized proteins).

Small, repeated doses of iodide, as in the following formula, may likewise exert a very favorable effect:

℞ Sodii arsenatis	0.08	gram (gr. $\frac{1}{4}$);
Sodii iodidi	5	grams (gr. lxxv);
Sodii chloridi	20	grams (5v);
Aquæ destillatæ	300	c.c. (f℥x).

S. Sig.: One tablespoonful with the noon and evening meals.

Ferrier's recalcifying treatment.

Recurring Pleurisy.

Repeated punctures, medicated injections, autoserotherapy and injection of air into the pleura have alike proven ineffectual.

Dieulafoy has advocated *decortication of the lung*, as performed with success by Delorme, for suppurative pleurisy.

Respiratory exercises prove of service.

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NON-TUBERCULOUS SEROFIBRINOUS PLEURISY.

Pleurisy of Heart Cases.—This is more often a hydrothorax than an inflammatory pleurisy.

Paracentesis is indicated, to be performed *as soon as possible*. The withdrawal of fluid should be *gradual*; and the amount taken out should never exceed 1 liter.

Paracentesis frequently restores all their power to the heart-tonics, after it had seemed lost. Immediately after the puncture, the customary treatment for heart-failure should be brought into action.

These effusions reform very quickly; one should continue repeating the puncture as soon as the fluid reappears.

The *chloride-free diet* is of much importance in these cases.

Pleurisy of Nephritic Cases.—As soon as the effusion has attained a considerable size, if it fails to show a tendency to rapid reabsorption under the influence of the general treatment, it must be evacuated, as it mechanically hinders the respiration and circulation.

Stress must be laid on a chloride-free diet and diuretics.

Rheumatic Pleurisy.—The pleural effusion, generally of small extent, accompanying a congestion of the lungs, rapidly disappears under sodium salicylate.

Paracentesis is, as a rule, unnecessary.

Typhoid Pleurisy.—This is generally of small volume, and is absorbed without puncture. The bath treatment may be continued.

Syphilitic Pleurisy.—This is met with in the secondary stage, less commonly in the tertiary stage. Mercury, arsphenamin and potassium iodide should be given.

The *pleural disturbances of late congenital syphilis* are in no wise different from tuberculous pleural conditions; they make their appearance at the age of thirteen to twenty-two years in individuals exhibiting stigmata of inherited syphilis. While refractory to all other treatments, they yield rapidly to mixed treatment.

Following is a summary outline of treatment:

ACUTE SEROFIBRINOUS PLEURISY.—I. **Hygienic Measures.**—The patient should be placed in a large, airy, well-ventilated room, sunny if possible, and of even temperature (about 18° C.—65° F.); draughts and exposure should be avoided (an undershirt should be worn).

An exclusive milk diet. Every two hours, 200 cubic centimeters of milk, with or without sugar, hot or cold, if need be with addition of a little tea, coffee, Vichy water, tapioca, or vermicelli.

II. Regular Treatment.

1. Four times daily, one of the following cachets with a half cupful of an infusion of triticum with addition of 2 teaspoonfuls of milk sugar:

℞ Scillæ pulveris 0.15 gram (gr. iiss);
 Theobrominæ 0.5 gram (gr. viiss).
 Pone in cachet. No. i. Da tal. No. xl.

2. Three times a week, in the evening, one of the following pills:

℞ Extracti belladonnæ 0.01 gram (gr. ⅓);
 Resinæ podophylli 0.05 gram (gr. ⅓);
 Aloes 0.15 gram (gr. iiss).
 Ft. pil. No. i. Da tal. No. x.

III. Symptomatic Treatment:

1. Where the initial pain in the side is severe, four wet cups over the seat of pain, and, if necessary, an injection of morphine.

2. In the event of dyspnea, cupping or mustard applications. The following combination may be given in dessertspoonful doses:

℞ Syrupi ætheris (2 per cent.),
 Syrupi morphinæ (0.05 per cent.) 60 c.c. (f3ij).—M.

3. If there is extensive effusion (cardiac displacement, descent of the liver, flatness below the scapular spine, subclavicular dulness), even in the absence of pronounced dyspnea, and at the latest from the fifteenth to the twentieth day, a slow, interrupted withdrawal of 1 to 2 liters of fluid should be carried out with the Potain or Dieulafoy aspirator or Duguet's syphon, under strict aseptic precautions.

(The puncture should be made in the 6th, 7th or 8th costal interspace, just above the upper border of the rib forming the lower boundary of the interspace. The evacuation should be slow, with a careful watch kept on the patient's respiration and pulse for evidences of edema of the lungs or collapse. Paracentesis should be discon-

tinued in the event of paroxysmal cough, pain, dyspnea or intermittent heart-action.)

This procedure should be repeated as often as necessary.

IV. Prophylactic Treatment in Convalescence:

1. Convalescence in the country, preferably in the mountains at an elevation of 1500 to 1800 meters (4900 to 5900 feet).

A generous and substantial diet.

Adaptation to the continuous open air treatment.

Systematic respiratory exercises; walking, singing, fencing.

2. A little *calcium phosphate* to be dusted over the food.

3. For ten days in the month, with the meals, a *tablespoonful* of the following solution:

℞ Sodii arsenatis	0.1 gram	(gr. iss);
Potassii iodidi	5 grams	(gr. lxxv);
Aquæ destillatæ	300 c.c.	(f℥x).—S.

For the next ten days, with the meals, a *teaspoonful* of:

℞ Strychninæ sulphatis	0.03-0.05 gram	(gr. ½-¾);
Sodii glycerophosphatis (N. F.)	10 grams	(3iiss);
Extracti cinchonæ	20 grams	(3v);
Spiritus vini vitis	40 c.c.	(f℥x);
Glycerini	q. s. ad 150 c.c.	(f℥v).—M.

For the remaining ten days, codliver oil or meat juice.

ACUTE SEROFIBRINOUS PLEURISY IN CHILDREN.—

Aside from the rheumatic and metapneumonic pleurisies, this condition in children is nearly always of tuberculous origin, and yet is readily recovered from—in fact, nearly always progresses to spontaneous recovery under good hygienic treatment. The treatment already described for pleurisy in the adult is suitable in this condition, with the necessary modifications of dosage in accordance with the patient's age.

I. **Hygienic Measures.**—*Rest in bed* until the fever subsides (at least three weeks), in a well-ventilated, sunny room with the window open. Exposure to cold should, however, be avoided, and an undergarment worn.

A liquid diet: Milk and milk preparations, tea, coffee with milk, milk soups, onion soups with milk, fruits, dry biscuits, orangeade, lemonade, infusions.

II. **Regular Treatment.**—1. Four times daily, a cupful of diuretic infusion (*e.g.*, one of triticum or cherry stems) and one of the following powders:

℞ Theobrominæ 0.25-0.5 gram (gr. iv-viiij);
 Lactosi,
 Sucrosi cum vanilla (1 per cent.) āā 8 grams (3ij).
 Pone in chart. No. xx.

Or, the following liquid preparation, to be taken in the course of three days:

℞ Potassii acetatis,
 Potassii nitratis āā 3 grams (gr. xlv);
 Oxymellis scillæ (N. F.) 30 c.c. (fʒj);
 Infusi juniperi (10 per cent.) 130 c.c. (fʒivss);
 Syrupi aurantii amari 100 c.c. (fʒiiiiss).—M.

2. Purgation two or three times with sodium sulphate—2.5 grams (38 grains) per year of age—or magnesium citrate solution.

3. If the pleurisy is of *rheumatic* origin: Sodium salicylate and sodium bicarbonate, of each 0.5 gram (7½ grains) per year of age.

III. **Symptomatic Treatment.**—If the pleurisy is *metapneumonic*, *antipneumococcus serum* may be tried.

If there is *severe pain in the side*: Mustard applications, poultices with laudanum, wet cupping.

If *cough is severe*, a sedative mixture, syrup of codeine, or bromoform.

If the *effusion is extensive*—but only in this event—slow, cautious and moderate paracentesis.

IV. **Treatment of Convalescence.**—1. Hygienic instructions (see above).

2. For ten days a month: Hypodermic injections of sodium cacodylate, 0.05 to 0.1 gram (¾ to 1½ grains).

Next ten days: Iodotannic preparations with phosphates.

Last ten days: Meat juice or codliver oil.

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HEMORRHAGIC PLEURISY.—The general therapeutic indications are the same as in serofibrinous pleurisy.

Many cases of hemorrhagic pleurisy are instances of recurrent pleurisy, especially those related to tuberculous disease or cancer. As each puncture removes a quantity of blood which may exceed 1 liter, repeated punctures may lead to an actual cellular anemia. One should, therefore, be as sparing as possible in regard to paracentesis.

Injection of air after paracentesis is particularly indicated in these cases: The pressure on the lung and pleura will prevent their bleeding.

Hemostatic agents may also be injected into the pleura: Adrenalin, a 1 per cent. solution of calcium chloride or a solution of ferric chloride; more particularly, 10 to 30 cubic centimeters ($2\frac{1}{2}$ to 8 drams) of horse serum.

* * *

PURULENT PLEURISY.—General Treatment.—The treatment comprises the same general measures as in serofibrinous pleurisy, as regards hygiene, diet, medicinal measures, etc. In empyema consequent upon infectious diseases, benefit is obtained from *intravenous injections of colloidal metals* (electrargol, gold collobiase, etc.). During convalescence, the same instructions as to fresh air treatment, respiratory exercises, etc., should be given as in serofibrinous pleurisy. To combat the muscular atrophy often following pleurisy, recourse should be had to *massage and electricity*.

Local Treatment.—*Pleurotomy* is the treatment of choice in purulent pleurisy. It should almost be the rule, as incision is the rule in the treatment of acute abscess: *Ubi pus, ibi evacua*. Incision through a costal interspace, even with rib resection, is, indeed, a relatively minor operation and may be carried out without general anesthesia, under local or regional anesthesia. There is, therefore, no reason for hesitating and waiting. Valuable time is thus lost, for *early* pleurotomy alone is certain to yield successful results. It has the advantage, also, of forestalling the formation of pseudo-membranes which would hinder expansion of the lung, cause the empyema to become chronic and favor the production of post-operative fistulas.

Empyema in Influenza.—Nevertheless, according to recent experience, in influenzal infections early operation is inadvisable. It is better to wait a while and build up the patient with intravenous injections of hypertonic glucose solution, electrargol, strychnine, camphor in oil, etc.

If the patient, suffering from dyspnea, is rather a lung case than a pleuritic case, operation should not be carried out, for the pleural exudate, even though purulent, may undergo absorption either spontaneously or after a simple puncture followed by an injection of air permitting of complete evacuation of the pus, and by the injection of a medicinal fluid (methylene blue, 2 cubic centimeters—30 minims—of a 1:20 solution).

Vaccine therapy and serum therapy may and should be attempted. They sometimes yield remarkable results.

Use should be made of stock vaccines, or better, autogenous vaccines, corresponding to the bacterial species in the effusion (pneu-

mococcus, streptococcus, or staphylococcus), or else vaccine G of the Institut Pasteur, containing 4000 million streptococci, 2000 million Pfeiffer bacilli, and 2000 million staphylococcus aureus to the cubic centimeter; 0.25 cubic centimeter is injected at the start, and the dose increased each day up to 1.5 cubic centimeters.

In cases of pneumococcic infection, one should use especially anti-pneumococcic serum, either by intramuscular injection in the dose of 80 to 100 cubic centimeters, or, in grave cases, by intravenous injections in doses of 40 cubic centimeters, diluted in physiological salt solution with addition of 10 drops of 1:1000 adrenalin solution. The injection should be made very slowly.

Gangrenous and Putrid Empyema.—These conditions demand early pleurotomy followed by continuous aspiration of the pus. Either antiseptic irrigations (Dakin's solution, iodine or potassium permanganate solutions, etc.) should be used, or continuous injections of antiseptic gases, such as ether, with the aid of a special (Lé Faguays's) device.

The use of antigangrenous serum, however, has afforded cures without surgical intervention. It must be employed early, and even used following pleurotomy, to hasten recovery.

Generally use is made of a mixture of equal parts of polyvalent serum (that of Leclainche and Vallée, for example) and of the specific serum, if it has been possible to identify the specific germ (anti-*perfringens* serum of Veillon, anti-*œdematiens* serum of Weinberg and Seguin, or anti-*bellonensis* serum of Sacquépée). From 30 to 60 cubic centimeters of the mixture are thus injected intramuscularly. In very grave cases, an intravenous injection is given.

Empyema in Scarlet Fever.—This is an uncommon condition. The pyogenic agent is the streptococcus or pneumococcus. Early pleurotomy is indicated.

Pneumococcic Empyema.—This ordinarily develops in the stage of decline or during convalescence from pneumonia; it may, however, be primary.

The pneumococcus rapidly loses its virulence; about the sixth day, cultures on bouillon become sterile. Accordingly, in pure pneumococcus empyema, a discharge of pus through the bronchi or a single paracentesis has in many instances been sufficient to bring on recovery.

Pneumococcus empyema is relatively mild, especially in children. This is, however, not always the case.

Virulent pneumococci have been met with in exudates dating back 3½ months.

The treatment may be begun with paracentesis in cases in which the bacteriologic examination has shown the pneumococcus to be alone present.

The evacuation of the pus should be followed by an intrapleural injection of 10 to 20 cubic centimeters ($2\frac{1}{2}$ to 5 drams) of electrargol, warmed to 38° C. (100.4° F.), or of 2 cubic centimeters (30 minims) of a 1:20 solution of methylene blue, or better, 80 to 100 cubic centimeters of antipneumococcic serum.

On the succeeding days further injections of 50 cubic centimeters of this serum are given either intramuscularly or into the pleural cavity.

Antipneumococcus vaccine and serum treatments have afforded some excellent results, even in cases of abscess of the lung.

Pleurotomy may, however, become necessary in sacculated empyemas and in those which reform too rapidly. The majority of observers recommend that punctures be not continued too long and that pleurotomy be resorted to as soon as possible; for *early* pleurotomy alone yields sure results, and recoveries in a period not exceeding three to six weeks.

Streptococcic Empyema.—The streptococcus is the pathogenic agent which is encountered most commonly in purulent pleurisy (in over three-fourths of the cases in adults).

In these cases pleurotomy should be carried out as soon as possible, since in this variety vaccines or antistreptococcic serums are generally ineffective.

Staphylococcic Empyema.—Early pleurotomy. One may, however, begin by using antistaphylococcic vaccine (stock, or better, autogenous) in conjunction with paracentesis. If the pus reforms rapidly, there should be no further temporizing, and pleurotomy should be carried out.

Empyema in Typhoid Fever.—If the amount of fluid is very small, a simple puncture may be employed first. The baths may be continued.

When, however, there is present a rather extensive purulent exudate, pleurotomy is necessary. A serious general condition of the patient is not a contraindication, as the presence of the pus can only aggravate the situation.

TUBERCULOUS EMPYEMA.

I. Purulent Pleurisy Due to Any Kind of Germ in a Tuberculous Subject (Secondary Infection).—Recovery from such an empyema may occur under pleurotomy. Far advanced or rapidly progressive

tuberculosis would contraindicate pleurotomy; in such cases paracentesis would be practised in order to improve the patient's condition.

If the empyema is of the mixed type (combination of the tubercle bacillus and a pyogenic organism), the prognosis is very grave. Pleurotomy is very likely to leave a fistula. On the other hand, punctures fail to bring about recovery, the pus reforms, and the patient becomes exhausted and ultimately succumbs. Intrapleural injections of camphorated naphthol, camphor in oil, gomenol in oil, iodine solutions and iodoform in glycerin (2 to 4 grams— $\frac{1}{2}$ to 1 dram—of iodoform in 8 to 16 cubic centimeters—2 to 4 fluidrams—of sterilized glycerin) have been tried in these cases. Electrargol should, in particular, be used.

II. Purulent Pleurisy Consequent upon Pneumothorax (Tuberculous Pyopneumothorax).—The fluid contains tubercle bacilli and pyogenic organisms (mixed empyema).

If the tuberculous condition is in an early stage, recovery from the pyopneumothorax may occur. Multiple punctures have yielded some successful results. They should be followed up with injections of nitrogen, oxygen or air. They do not, however, empty the pleura thoroughly by reason of the permanent retraction of the lung; hence, there results a devious cavity which cannot be dried up. Pleurotomy is to be preferred; unfortunately, a persistent fistula is almost the rule.

III. Pleural Tuberculosis: A Pleural Cold Abscess (True Tuberculous Empyema).—The method of choice is that entailing repeated punctures with injections of nitrogen or air and of a medicinal fluid (iodoform in glycerin, electrargol).

As for the **general medical treatment**, it should be chiefly:

(a) *Tonic* (open air cure, substantial diet, strychnine, arsenic, cinchona, glycerophosphates, alcohol, raw meat, etc.).

(b) *Antiseptic* (terpin hydrate, thiocol, sodium thiosulphate, etc.), principally if there is concomitant pulmonary infection.

ABSCESS OF THE LUNG. .

(From a description by VICTOR PAUCHET, M.D.).

Abscesses of the lung may be ordinary suppurative processes or putrid gangrenous abscesses.

Etiology.—They are twice as common in men than in women, and are rather rare in children. They generally follow a pneumonia or bronchopneumonia, particularly when consequent upon influenza.

Bronchiectasis, pulmonary tuberculosis, a foreign body in the bronchi, or pathogenic germs from an esophagus which is ulcerated below a stricture or cancerous growth, may induce an abscess of the lung.

In the declining stage of appendicitis or of infectious *jaundice*, following *embolism*, or in the course of puerperal sepsis, foci of pulmonary gangrene have been noted.

In the abscess may be found pneumococci, staphylococci, streptococci, colon bacilli, anaërobic germs, etc.

Symptoms.—Onset: In the form of pneumonia, dilatation of the bronchi, or a general infection. Abscess is suggested by the persistence of the *local signs* and by copious purulent expectoration. Sometimes, in the subjects with bronchial dilatation, the expectoration increases and the *cough* is more persistent; the *temperature* rises and the *general condition* shows aggravation.

Yellowish hue of the skin, loss of weight, vesperal fever, night-sweats, foul breath; locally, all the signs of a lung cavity, which may or may not be filled with fluid—prominence of the chest wall, reduced amplitude of the respiratory movements, flatness, and absence of fremitus. If the cavity empties itself: Tympany, amphoric breathing, gurgling sounds, etc.

Examination of the sputum alone may lead to exclusion of the diagnosis of *pulmonary tuberculosis in the third stage*.

Interlobar pleurisy exactly resembles abscess of the lung; in practice, differentiation is impossible. *Bronchiectasis* runs a slow, gradual course; the diagnosis is easy when the case has been followed from the start. *Suppurating hydatid cyst* of the lung is often mistaken for an ordinary abscess; clinical differentiation is impossible; the sputum should be examined for hydatid membranes. *Abscess of the liver* opening into the bronchi simulates lung abscess all the more in that the two conditions frequently coexist. The distinction is made by radiography.

(a) **Auscultation.**—The ear localizes the seat of the sounds of a cavity at the point where it hears them the loudest. This point does not correspond to the location of the abscess.

In the lower half of the lung, *the ear always aims too low* (Tuffier); the abscess is always higher up than the point of maximum loudness.

In the upper half, *the ear always aims too high* (Delbet), *i.e.*, the abscess is thought to be higher up than it really is. The amount of suppuration does not bear a relationship to the size of the cavity.

(b) **Exploratory Puncture.**—In one-fourth of the cases the punctures bring no fluid, the needle missing the disease focus; the punctures should be carried out under X-ray guidance.

(c) **X-Rays.**—A dark area is seen, the center of which is light when the cavity is empty. The X-rays permit of differentiating an abscess above the diaphragm from a subdiaphragmatic abscess (Tuffier and Martin). In abscess of the *dome of the liver*, an abnormal upper boundary of the liver shadow is noted; the shadow exhibits a clear-cut outline representing the pushed-up diaphragm. *Abscess of the lung* is manifested in an ill-defined, soft outline; a light band between this shadow and the vault of the diaphragm locates the pus collection in the lung. In *pleurisy* the upper level of the shadow does not show a concavity directed downward as does the margin of the diaphragmatic shadow.

Treatment.—In the time elapsing before operative intervention, the patient should be subjected to the continuous open air treatment as though he were a consumptive.

Pulmonary antiseptics: Eucalyptus, creosote, etc.

Some abscesses of the lung, especially those following a primary pneumonia, may open spontaneously, recovery occurring without operation.

Operation should be resorted to without hesitation in the presence of copious expectoration, a foul breath, and a temperature of the hectic type. In the cases with multiple foci, opening of the main focus only is often sufficient. The presence of a *bilateral* focus, however, contraindicates operation.

Operative Technic.—(a) **Anesthesia.**—Ether. As soon as the patient is under, the anesthesia should be kept of light degree.

(b) **Thoracotomy.**—A broad flap with a posterior or superior base should be cut, always in such a manner that its lower margin is very low down, so as to afford good drainage.

(c) **Penetration of the Pleura.**—This is easy if there are adhesions; if not, the pleura should be sutured after having anchored the lung and fastened it to the wound. If the pleura is free, it should be packed with gauze throughout the extent of the abscess, a few days allowed to elapse for the formation of adhesions, and pneumotomy then carried out.

(d) **Location of the Abscess.**—The lung should be palpated, and an area of fluctuation or induration sought; a needle or trocar should be introduced, yielding pus, and then allowed to remain *in situ*.

(e) **Incision of the Lung.**—This is easy in the case of a superficial abscess. If the abscess is deep, the lung tissue bleeds freely; the hemorrhage is checked either by incising with the thermocautery, applying the cautery to the cut surface left by the knife, or simply tamponing after incision with the knife.

(f) **Drainage.**—When the abscess has been opened, its cavity should be cleaned out with a tampon mounted on a hemostat and dipped in hydrogen peroxide solution. The head mirror should be used in order to see the cavity, *which should not be irrigated*, but well filled with zinc peroxide gauze loosely packed around a stiff drain emerging from the lower angle of the wound.

Untoward Happenings During Operation.—(a) *Pneumothorax*, compelling the surgeon to discontinue the operation.

(b) *Hemorrhage*, persistent, yielding to packing, but preventing continuation of the operation.

(c) *Respiratory difficulties*, *viz.*, choking spells due to flooding of the bronchi with pus. Care should be taken to use only light anesthesia.

Postoperative Complications.—Mortality, 30 per cent. After the operation the cough, expectoration, foul odor and fever generally disappear; but often the fever persists: In this event a stream of oxygen should be passed through the wound. Its reappearance points to poorly performed drainage, insufficient opening of the abscess, or the presence of another abscess in the vicinity; such an abscess should be opened into the first abscess.

These difficulties illustrate the importance of proper after-care and account for the frequency of secondary operative procedures.

Hemorrhage during convalescence, during a dressing or a coughing spell, may be fatal; if the surgeon reaches the case in time, the wound should be washed, freed of clots and packed.

Immediate Results.—The operative prognosis of septic foci of the lung is relatively good when they are dealt with at the proper time. The mortality is 30 per cent.

Remote Results.—These are not always favorable; recurrences are more likely to occur, and several patients have had to be operated upon several times.

Tuffier and Martin conclude: "Due distinction is to be made between the *acute*, frank septic foci, in which the prognosis is good and recovery readily obtained by operation, and the foci developing in lungs the seat of *chronic* disease, in which the least inflammatory exacerbation leads to serious recurrences, and the prognosis of which is poor."

HYDATID CYSTS OF THE LUNG.

The main factor in the **diagnosis** of this condition is fluoroscopy. The rounded shadow, with a clear-cut, fixed outline, "as though drawn with a compass," is, indeed, when elicited by fluoroscopic examination, characteristic of hydatid cyst.

In the second place, blood examination and Weinberg's test will confirm the parasitic nature of the tumor.

Thanks to these procedures, the diagnosis can generally be confirmed without resort to exploratory puncture, which, all agree, should be avoided on account of the dangers it entails.

As for the **treatment**, it is necessarily **surgical**, and, as in cyst of the liver, is carried out in the following separate steps: Exposure of the cyst, sterilization of its contents before evacuation, and treatment of the evacuated sac.

The simplest incision is that made over a long distance in a costal interspace, with the use of the automatic retractor. This route of access, without bone destruction, is sufficient, especially in children, for reaching and treating the majority of cysts of the lung. Extensive resection of a single rib appears preferable to the making of a flap.

The absence of pleural adhesions which is the rule in non-suppurating hydatid cysts facilitates examination of the lung and discovery of the tumor. Thus, pneumothorax should be allowed to become established spontaneously; then, the cyst having been located, the lung should be seized with forceps to fix it.

For fear of penetration of toxic fluids into the respiratory passages, introduction of formalin into pulmonary cysts is less regularly resorted to than in cysts of the liver.

Whenever one is dealing with a closed cyst with any evidence of communication with the bronchi, there is every advantage and no drawback in a preliminary introduction of formalin, which protects the patient from the risk of secondary hydatid implants.

The cyst having been emptied and the hydatid membrane excised, the cavity left in the lung may be dealt with in one of two ways, *viz.*, either by marsupialization and drainage or by reduction and suture without drainage. The prevailing tendency is to carry out a primary closure of non-suppurating pulmonary cysts.

An excellent precaution, once the cyst is closed, is to anchor with forceps the suture line of the cyst; this is advantageous alike in antagonizing retraction of the lung and in permitting easy evacuation in the event of intracystic effusion or infection.

In general, the technic involved in the treatment of pulmonary cysts is tending to become identical with that for cysts in the liver: With reduction without drainage as the procedure of choice, marsupialization is to be reserved for the main contraindications to the former procedure, *viz.*, infection of the cyst, calcification of the cavity, or a cyst difficult of access (V. Pauchet).

PULMONARY TUBERCULOSIS.

The main facts governing the treatment of pulmonary tuberculosis may be condensed into the following six propositions.

I. The treatment of pulmonary tuberculosis is, above all, hygienic and firmly based on the classic triad:

1. Carefully regulated rest, with gradual myotherapy.
2. Continuous open air treatment, with its adjuncts (heliotherapy, etc.).
3. A suitable diet, with calculated and reasonable overfeeding.

II. Certain remedial measures may favor the curative process of fibrosis and vaccination. Systematic treatment:

1. Continuously: Tonic and remineralizing medication.
2. Exceptionally, and in well selected cases, specific serum therapy yields encouraging results.

III. Many accompanying symptoms (cough, hemoptysis, anorexia, etc.) need to be opposed with suitable symptomatic treatment.

IV. The treatment should be strictly adapted to the individual case, taking into account the kind of morbid process (acute, subacute or chronic), its location and its tendency to progression or regression, the constitution of the affected subject, his reactions to the disease and to medication, the social circumstances, etc. The essence of the clinical management of this disease is: There is no tuberculosis; there are only tuberculous patients.

Chronic pulmonary tuberculosis is very variable in its course, first of all, in accordance with its pathologic lesions—the three general forms of it, *viz.*, miliary tuberculosis, caseous pneumonia and chronic pulmonary tuberculosis, sufficiently indicate this—and secondly, from the standpoint of chronic pulmonary tuberculosis alone, according to the individual, his age, his temperament, his morbid tendencies, his morbid antecedents, the associated diatheses, etc. One cannot enough individualize the cases and split up the *clinical varieties*. The main varieties, knowledge of which is indispensable, will be reviewed herein.

V. It should not be forgotten that if tuberculosis is one disease, the passion for using drugs is another, and that abuse of drugs claims as many as its victims, perhaps, as tuberculosis itself.

VI. For practical purposes it may be said that as yet no specific form of medication for tuberculosis is of proven value; at the most, it may be granted that some serums and tuberculins have seemed, in the hands of a few virtuosi of tuberculosis treatment, to exert an auxiliary favorable action. These agents will be briefly considered under the next heading: *Specific Treatment*.

SPECIFIC TREATMENT.

"So far we possess no specific treatment for tuberculosis, either by way of vaccination or serum therapy." This proposition, stated by Armand-Delille and endorsed by Rénon, unfortunately still represents the true situation. The prevailing opinion is that held by Sabourin. In spite of the lapse of time, specific measures do not as yet seem to have gotten beyond the experimental stage. "Some high medical authorities attribute a certain number of recoveries to the tuberculins. It is to be hoped that these favorable results will be confirmed with sufficient frequency to carry conviction and elevate this method from the state of hesitation in which it is at present."

At all events, these specific procedures are of two varieties:

Active immunization: Vaccine treatment or tuberculin therapy.

Passive immunization: Antituberculous serum treatment.

TUBERCULIN THERAPY.—The term "tuberculin" is applied to any extract containing all or a part of the toxins of the tubercle bacillus.

The basic principle of tuberculin therapy consists in exciting the formation in the system of increasing amounts of antibodies by the injections of progressively increased doses of tuberculin. It is thus actually an instance of vaccination, or active immunization.

In favorable cases, the observed results are as follows:

A local *congestive*, inflammatory, or even edematous *reaction in the tuberculous focus* itself, constituting a manifestation of the selective affinity of the tuberculous cells for the tubercle toxins. This local reaction, when it remains within proper bounds, promotes healing and fibrosis.

A *general reaction*, with the formation of antibodies, a leukocytic reaction, improvement of Arneth's formula, and a rise in the opsonic index and in the agglutinating properties. This general reaction, when it remains within proper bounds, gradually brings about consolidation and immunization of the system.

Clinically there are observed after an injection:

A *local reaction at the site of injection*: Ordinarily, a temporary condition of tension with redness; less commonly, the formation of an erythematous patch with more marked pain calling for the application of wet compresses; exceptionally, a pseudo-phlegmonous reaction with red and painful edema, which may persist for two or three days and necessitate the application of wet dressings. This last reaction is alone an indication relative to a slackening or reduction of the treatment.

A *local reaction in the tuberculous focus*, manifested subjectively by a slight recrudescence of the cough, a slight feeling of oppression, slight sensitiveness over the lesions and reduction of the expectoration; very exceptionally, by a hemoptysis or at least a reddish discoloration of the sputum. At times this reaction may be appreciable, upon careful auscultation, by some change in the sounds.

A *general reaction* expressed mainly in a more or less pronounced rise of temperature; ordinarily, this seldom reaches 0.8 to 1° C. (1.4 to 1.8° F.) and does not last longer than two or three days. A slight pulse acceleration is noted, and sometimes general malaise, indefinite pains, digestive disturbances and a slight, temporary diminution of weight.

All this is comprised in the typical reaction, and it is precisely the nature of these reactions which regulates the continuation and ascent of the dosage of tuberculin.

In unfavorable cases or under poorly managed treatment, definite untoward results are witnessed which necessitate reduction or even discontinuance of the treatment.

These untoward results may be summed up essentially as an aggravation of the tuberculous focus by an exacerbation with extension of the disease. Clinically they are manifested in:

A severe and persistent temperature reaction (39 to 39.5° C.—102.2 to 103.1° F.).

The appearance of râles around the primary focus.

Recrudescence of the oppression, cough and cyanosis.

Digestive disturbances (anorexia, diarrhea), with resulting loss of weight.

Insomnia and pain.

A marked aggravation of the general condition.

Such an exacerbation either follows an irretrievably fatal course or subsides after a varying period of time. Properly conducted treatment should certainly avoid it—in *tuberculin therapy, the dosage is the whole story*,—and provided the treatment is begun with an extremely small dose, and increase of dosage is carried out only very slowly, the untoward results above mentioned should never occur.

Of the many tuberculins available, reference will be largely confined here to the one which has been most widely availed of in France, *viz.*, the pure solidified tuberculin (Institut Pasteur).

Technic of Tuberculin Therapy.

Crude tuberculin is a glycerinated and sterilized liquid extract of cultures of the tubercle bacillus. It occurs as a brown fluid of viscous consistency and having an odor of honey and of flowers.

Purified solid tuberculin is obtained by precipitating crude tuberculin with 10 times its volume of alcohol at 80° C. This precipitate is washed with ether, then dried *in vacuo*.

For therapeutic use a 1:10,000 dilution of the tuberculin is prepared with sterilized distilled water. One cubic centimeter of the product thus contains 0.0001 gram of purified solid tuberculin. It is given by hypodermic injection, after preliminary dilution.

(It is well not to confuse this therapeutic dilution of tuberculin with the 1:100 dilution used for diagnostic purposes in the ophthalmic and skin tests.)

Perusal of the countless papers contributed on tuberculin therapy shows that it is practically impossible to formulate a precise technic. It is mainly a question of individual observation and experience. The dosage used by different observers shows marked discrepancies.

Let it be merely noted that, especially at the start, the doses given should be extremely small, and should be increased only slowly, cautiously and according to tolerance.

Küss mentions $\frac{1}{2000}$ milligram of purified solid tuberculin as the initial dose and $\frac{1}{20}$ milligram as the maximum dose, not to be exceeded. The injections should be given at intervals of three to four days and gradually increased (successive doses being generally doubled) unless there occurs an intense and prolonged reaction with loss of weight.

As for the preparation of the solutions to be injected, this should be carried out extemporaneously with the utmost aseptic precautions, alike as regards the solutions, syringes and needles. Starting with the general principles that: 1. One cubic centimeter is a suitable standard dose for injection. 2. Physiologic salt solution is a good medium. 3. The extreme range of dosage is comprised between $\frac{1}{2000}$ and $\frac{1}{20}$ milligram of solid tuberculin, the following schedule may be drawn up:

Tuberculin, 1:10,000.	Salt solution	One c.c. of the solution contains
c.c.	c.c.	
1	200	$\frac{1}{2000}$ milligram.
1	100	$\frac{1}{1000}$ "
1	50	$\frac{1}{500}$ "
1	25	$\frac{1}{250}$ "
1	12	$\frac{1}{120}$ "
1	6	$\frac{1}{60}$ "
1	3	$\frac{1}{30}$ "
1	2	$\frac{1}{20}$ "

Indications and Contraindications to Tuberculin Therapy.—On the basis of the conclusions of Küss, these may be summarized in the following table:

Indications.	Contraindications.
Recent tuberculosis, well circumscribed, with little fever, and tending to run a favorable course.	Acute tuberculosis (miliary). Very extensive tuberculosis with bad general condition.
Latent or larval tuberculosis with evanescent flare-ups and weakened general condition (pseudo-anemia, pseudo-dyspepsia, pseudo-neurasthenia).	Tuberculosis with multiple localizations in various structures.
Fibrocascous tuberculosis clinically at a standstill.	Tuberculosis complicated by heart disease, nervous diseases or grave secondary infections.
Bilateral, sluggish tuberculosis running a slow course.	Hyperthermia running a progressive course. Repeated hemoptysis.

Spengler's Immune Bodies.—The following procedure relative to the use of Spengler's "I. K." or immune bodies has been described by the author (*Presse méd.*, Apr. 24, 1920):

The treatment is begun with a 1:10,000,000 solution of the original product. In a hospital with 100 patients, therefore, 1 cubic centimeter of the original "I.K." is sufficient for six to eight weeks' treatment, *i.e.*, up to the time when the second solution (1:100) of the original product is to be used.

The use of the seventh solution (1:10,000,000), with which the treatment is begun, often produces, upon hypodermic injection, a very distinct *reaction* consisting in a *small amount of edema with erythema limited to the place of injection*. This is evidence that the injection is exerting an effect, and this effect continues as long as the edema remains sensitive to pressure. *The next higher dose*, 10 or 100 times more concentrated than the preceding one (sometimes, however, it is well to repeat the same dose), should be given only after complete disappearance of the reaction at the site of injection.

* * *

Nolf has advocated a treatment of pulmonary tuberculosis in which are combined:

1. Intravenous injections of 1 cubic centimeter of cupric hydroxide dissolved to saturation in a 10 per cent. solution of peptone; and later, in the patients whose fever has subsided under this treatment:

2. Antituberculous vaccine therapy. The vaccine consists of a suspension of the homogeneous human bacilli of Arloing, sterilized by the addition of 1 per cent. phenol and with one-third volume of

glycerin added. Nolf recommends two injections a week, by the intravenous route, beginning with 10,000 germs and then increasing gradually.

Nolf has himself called attention to the difficulties of the technic, which, in his opinion, had best be reserved for the sanatorium physicians

* * *

There is no reason to be very enthusiastic about tuberculin therapy, at least in its present condition, nor to consider it ripe for general practical use.

Following, at least, is the opinion of Calmette ("*Infection bacillaire et tuberculose*," p. 577, Masson, 1920) on the subject:

"In short, none of the procedures having for their purpose to destroy more or less completely by physical or chemical agents the vitality of the tubercle bacillus in order to transform it into a vaccine, has as yet succeeded in yielding satisfactory results. From the experiments carried out in this connection, however, there arises the impression that those of the procedures which do not cause too profound a change in the protoplasm of the bacillus permit of obtaining some favorable effects on the powers of resistance to grave infections."

Tuberculin therapy may later be the practical method of choice in tuberculosis, but is not such at the present time. It can be regarded only as an auxiliary measure, which, however, is not to be entirely neglected.

SERUM THERAPY.—After many prolonged investigations, serum therapy has even recently been regarded as ineffectual, fanciful, or even dangerous. An important communication on the subject has, however, been issued by Jousset (*Jour. méd. français*, Oct. 1918), whose conclusions are as follows:

Success in the serum treatment depends more on the selection of the patient than on the properties of the serum.

Antagonizing the tubercle bacilli themselves but not the tuberculous process, it successfully combats the acute hyperemic flare-ups of incipient tubercle bacillus infection, though remaining powerless in the face of the irreducible and destructive fibrocaseous lesions.

Clinically, it is adapted for advancing bacillary invasion, *i.e.*, for the acute primary forms in young individuals, and collaterally, for the acute flare-ups of chronic tuberculosis in adults.

The selection of the cases for treatment is governed by the temperature curve and the results of the skin test. Any individual presenting fever, of high or low degree, but regular and with but slight

oscillations, and who exhibits a positive skin test, may and should be treated with serum. Atypical fevers and hectic fever are auto-intoxication fevers and are not due directly to the tubercle bacillus infection. The serum has no hold on them.

Serum therapy, to be effectual, must be applied with massive doses, administered subcutaneously at sufficient intervals. Serum reactions, and especially, the local reactions, are by this means reduced to a minimum.

Severe general reactions are altogether exceptional when the cases are judiciously selected.

Local or general reactions are due to the inevitable toxicity of the horse serum and to an individual predisposition that cannot in any way be foretold, but present no serious features and are *always completely recovered from. They are in no way related to anaphylaxis.*

Following, according to Jousset, are the indications and contra-indications for serum treatment in tubercle bacillus infection:

Active Tubercle Bacillus Infection.

(Acute and Subacute Forms.)

Stage of Hyperemia. <i>(Serum Treatment Indicated.)</i>	Stage of Caseation. <i>(Not Curable by Serum.)</i>
<p>Typhobacillosis with bacillemia or miliary involvement.</p> <p>Bacillosis of the serous } Pleuroperitoneal type. Pericardiopleuroperimembranes. } toneal type.</p> <p>Serofibrinous or hemorrhagic pleurisy.</p> <p>Ascitic form of peritonitis.</p> <p>Serofibrinous or hemorrhagic pericarditis.</p> <p>Serous polyarthritis (Poncet's tuberculous rheumatism).</p> <p>Simple hydrarthrosis (hydrops tuberculosus).</p> <p>Disseminated pulmonary miliary disease (diffuse bronchitis).</p> <p>Pulmonary congestion } massive forms. Splenopneumonia } (pulmonary Hepatisation } hyperemia of } bacillary } origin).</p> <p>Discrete pulmonary congestion with successive flare-ups confined to the apex.</p> <p>Acute adenitis of the hypertrophic type; tuberculous pseudo-lymphoma.</p> <p>Various kinds of tubercle bacillus involvement (skin, bones, viscera, etc.).</p>	<p>Non-existent, the general miliary condition not having time to suppurate.</p> <p>Suppurative polyserositis (exceptional).</p> <p>Purulent pleurisy.</p> <p>Fibrocaceous peritonitis.</p> <p>Purulent pericarditis.</p> <p>Suppurative polyarthritis (exceptional).</p> <p>White swelling.</p> <p>Disseminated caseous bronchopneumonia.</p> <p>Caseous pneumonia..</p> <p>Ordinary fibrocaceous pulmonary tuberculosis.</p> <p>Suppurative adenitis.</p> <p>Analogous changes.</p>

Technic of Serum Therapy.—"The technic," says Jousset, "cannot be reduced to an exact code."

The only general principles are the following:

1. *Mode of administration:* The hypodermic route or, *very exceptionally*, in intolerant cases, the rectal route. •

2. *Dosage:* First dose, 1.5 to 2 cubic centimeters per kilogram of body-weight, *i.e.*, 100 to 120 cubic centimeters for an average adult of 60 kilograms (132 lbs.). The initial dose should be reduced to 20, 30 or 50 cubic centimeters in the presence of extensive lung involvement with a tendency to cyanosis.

3. *Intervals:* The injections are to be repeated at intervals of ten to fifteen days, according to the febrile, general and serum reactions (joint disturbances, etc.).

"Whenever the treatment, after the second injection, *i.e.*, in three weeks, has failed to improve the condition and lower the temperature, it should be abandoned."

Two, three or four injections are required, sometimes more.

THE HYGIENIC TREATMENT.

In the absence of any specific form of treatment, clinical observation and empiric therapeutic experience have shown that usually pulmonary tuberculosis exhibits a spontaneous tendency toward recovery, and that fortunately, in the majority of cases, especially at the start, placing the affected individual under favorable hygienic conditions is sufficient to procure regression and even cure of the tuberculous process. On account of the lack of concordance as to terminology, it is very difficult to give definite figures, but in a general way it may be said that in the initial germinal, congestive stage 90 per cent. of "hygienic" recoveries are observed; in the stage of conglomeration, 60 per cent.; in the stage of softening, 30 per cent., and in the stage of cavity formation, 5 per cent. These figures are, in the aggregate, very reassuring and sufficiently illustrate the importance of early diagnosis. The foregoing coefficients of "spontaneous hygienic" recovery should always be kept in mind in estimating the value of all curative or supposedly curative procedures. Rational, systematic and persevering hygienic measures are sufficient, then, to lead to a spontaneous cure in the majority of cases of tuberculosis, without counting those who recover in spite of poor hygiene.

The main indications relative to hygiene in general are met by the diet, regulation of physical activity, and fresh air. On the basis of

these three factors, the hygiene of the consumptive has reduced itself to an established triad: Overfeeding, open air treatment and rest.

Further explanation of each of these terms is in order.

I. OPEN AIR TREATMENT.—A. General Features.—One of the customary and most important therapeutic factors in the treatment of tuberculosis is the fresh air treatment. Its fundamental principle is continuous aëration: Life in the open air in the daytime and sleeping with the windows open at night. It can be carried out in all seasons, in all latitudes, whether in the mountains or at the seashore, provided the *modus faciendi* be adapted to the climatic and seasonal requirements.

In the *daytime*, it may, if the weather and the patient's condition permit, be practised simply by out-of-door life, with walks or sports, or with rest in a locality with pure air, well sheltered from the winds. One of the advantages of the localities with relatively warm winter climates lies principally in the possibility of leading this out-of-door life even in the winter. If the weather is bad, the patient in relatively poor condition or the time of day unfavorable, the cure should be carried out by resting on a steamer chair sheltered from the wind (on a porch or in a shelter, shack, tent, etc.), with the head and trunk in the shade and the rest of the body in the sun. The patient should be more or less heavily covered according to the season. In the winter, he should be wrapped in suitable outer garments or lie in a fur bag, with a hot-water bag at the feet, if required.

In the resorts in which a noticeable drop in temperature occurs at sunset, with sudden condensation of moisture, the patients should go in the house if they have been outside, or close the window if they are in bed. Later, they may go out again or reopen the window.

In the *night*, the patient should likewise be more or less warmly clothed, preferably with a flannel nightshirt and a woollen garment with high collar and sleeves, together with blankets, quilts and hot-water bottles, according to the season. The patient should be gradually accustomed to sleeping with a window open in the adjoining room; then in his own room, with the curtains in apposition; next, with the curtains apart and the window open, a screen being used, if necessary, to afford him protection against a direct stream of cold air.

Some observers recognize no contraindications to the open air exposure, either as regards the weather or the patients themselves. One of the most determined partisans of continuous fresh air exposure (Lalesque), however, expresses himself as follows:

"Yet it should not be imagined that nocturnal open air exposure in very cold weather, even in temperate climates, may not lead to some unpleasant results. If these are known, however, they may be obviated.

"The patients, on awakening, may complain of sore throat (mild pharyngitis, red tonsils, temporary hoarseness). These patients breathe poorly, sleeping with the mouth open. In the daytime they should be trained to breathe physiologically through the nasal passages; they should be subjected to the discipline of respiration just as they are disciplined as regards the cough. Other patients complain of slight headache. A silk scarf or night-cap will remedy this difficulty. Again, one may come across rheumatic pains in the back of the neck or the shoulders; these are obviated by the wearing of a flannel shirt extending higher up and thicker, as well as by rubs on retiring and awakening.

"Continuous aëration is likewise capable of inducing the commonest form of frostbite of the first degree, *viz.*, chilblains, the result rather of the repeated action of the cold than of the intensity of exposure. Its favorite situation in the fingers shows the preponderating influence of exposure in the daytime on its appearance. Accordingly, in continuous very cold weather, it is well to have the patients wear thick gloves.

"All these untoward happenings are temporary and preventable.

"In no case do they contraindicate the open-air treatment, the importance of which is no less than that of proper feeding."

This is in conformity with my own opinion; however, disturbances of the upper respiratory channels, such as rhinitis, pharyngitis, laryngitis and tracheitis, appear to me to call for some moderation in the practice of nocturnal direct aëration in cold weather. Similarly, in the debilitated and weakened, with a tendency to subnormal temperature, it may be dangerous to allow the temperature of the room to go below 8 or 10° C. (46-50° F.). In such cases it is well to warm the room, preferably by the hot water system or by means of a brisk wood fire.

Daremberg forbids having the window open *at night* in young tuberculous patients whose temperature is subject to a descent below 36° C. (96.8° F.) between 2 and 5 a.m. He also believes that old consumptives who experience a sensation of cold during sleep are unable to get accustomed to the open window, and forbids opening of the windows in rooms occupied at night by consumptives whose temperature becomes markedly subnormal.

With these exceptions, one can agree with Dercq's dictum to the effect that "the window should be closed during ablutions and rubs and at sunset; open, the rest of the time."

B. **Sanatoriums.**—The open air treatment and, in a general way, climatic treatment, may be practised anywhere and in all climates by an intelligent and properly drilled patient in a private dwelling or home sanatorium. There is frequently advantage, however, in recommending a stay in the institutional sanatorium.

The sanatorium should meet the following requirements: 1. Location in a suitable climate (pure air, sufficient sun exposure, shelter from the wind, permeability of the soil, vicinity of forests, etc.). 2. Suitable construction (large, airy rooms, easy to heat and to disinfect; suitably oriented verandas; washable flooring—linoleum, paraffin, etc.); paths in the woods, with shelters, etc. 3. A specially organized diet kitchen. 4. A medical organization insuring continuous supervision.

The sanatorium may consist either of large buildings of the hotel type; of pavilions or cottages, more or less separated, or of tents.

This question of the sanatoriums has been much discussed and I have heard equally passionate panegyrics and adverse criticisms in this connection. Most of the supporters and detractors of sanatoriums will subscribe, with a few quantitative variations only, to the following two propositions:

1. *The sanatorium is not an indispensable factor in the cure of tuberculosis.*
2. *The sanatorium is one of the most valuable agencies in the cure of tuberculosis.*

The sanatorium is not an indispensable factor in the cure of tuberculosis because we are daily seeing tuberculous cases, even when poorly treated, progressing spontaneously toward recovery or practical recovery, and tuberculous cases running a grave course stop and improve or recover under the hygienic-dietetic treatment as carried out independently by a systematic, energetic and well-drilled patient.

The sanatorium is one of the most valuable agencies in the cure of tuberculosis because there are constantly being improved or cured there more or less grave forms of tuberculosis which had not improved under independent treatment or which seemed doomed to run a fatal course.

The *advantages* of the sanatorium are:

1. An organization especially adapted for the institution of the open air treatment—a facility more rarely procured in as correct a form in independent treatment.

2. A rational, rigid and enlightened discipline, which, in conjunction with the constant emulation of a cure carried out in common, makes of the sanatorium a wonderful school of hygiene in which the patient learns to rest, to undergo a course of training, to breathe in the open air, to feed himself properly, to avoid coughing uselessly and infecting others, etc., and is thus enabled later to carry out independent treatment himself.

3. Systematic and continuous medical supervision which, carried out by a well-posted physician with experience and personal authority, insures quantitative climatic, hygienic and dietetic direction exactly suitable for the case under consideration.

4. Actual economy, the collective cure generally entailing materially less expense than the independent cure.

5. Isolation from the familial and social relationships, which frequently insures for the patient physical and mental rest and affords the possibility of his leading a purely vegetative life in which all the latent energies of the body are availed of for the purposes of recovery.

Yet, as a matter of fact, this psychotherapeutic factor is a two-edged sword, and constitutes, it seems to me, the criterion as to whether sanatorium treatment is indicated or contraindicated. To form a proper conception of it, the patient's associates, the patient himself and the physician in charge of the sanatorium must be given due consideration.

The sanatorium may be considered formally indicated when the patient's associates are affrighted, pessimistic, restless and are likely to annoy the patient, alarm him and tire him without being able to insure for him the indispensable systematic and patient treatment. The same is true in the case of the undisciplined or simply weak or discouraged patient who is incapable of subjecting himself to the strict and studied discipline of a new mode of life wholly directed toward a curative end. This applies to many young patients.

The sanatorium can be looked upon as merely an adjunct where the patient's home environment is calm, well-poised, devoted and patient, and is perfectly prepared to afford the desirable atmosphere of rest, quiet, good humor and enlightened attention; also, with an energetic and persistent or merely intelligent and docile patient, capable of understanding and carrying out the prescriptions of a systematic course of hygiene.

It is in the physician's province, however, to make keen and wise estimates of the different cases. There are some affective natures that seem to have adopted as a motto, like the ivy, "I die where I take hold," and who could not without cruelty and risk be torn from their

associates, affections and "raison d'être." There are some to whom entrance into a sanatorium would be the equivalent of a death sentence.

In this species of psychotherapy the personality of the sanatorium physician sometimes plays a preponderant rôle; it seems unnecessary to dwell on this fact further. Very often it may be said that "the sanatorium is worth exactly as much as its physician." It is he, his presence, the confidence he inspires, and the good humor he radiates that impart to the patient patience and hope, those two prime virtues of psychotherapeutic orthodoxy.

C. Climatic Treatment.—At the beginning of this study it will be well to recall the following formal proposition: "There are climatic factors of capital importance in tuberculosis treatment which may be met with at the seaside, in flat country, and in mountainous regions of low, intermediate or high altitude. *But there is no specifically curative climate for tuberculosis.*"

The common belief in the specific action of some form of climate on the tuberculous processes cannot but do harm.

Our utilizable therapeutic measures in each climate are comprised in the intermediate zones; they may act too powerfully and in a prejudicial manner in some marine or high altitude resorts. To recommend such resorts, it is necessary, accordingly, to individualize the cases very carefully.

The climate which will generally be suitable for pulmonary tuberculosis must combine the following characteristics:

1. Especially and above all, *abundance and chemical and bacteriologic purity of the air*; this is the essential, indispensable factor, the others being comparatively of secondary importance.
2. Abundance of luminosity, the great *coefficient of insolation*.
3. Relative dryness, or *moderate hygrometric level*, except in certain clinical species, as we shall see later on.
4. Protection from *winds*.

These conditions may be found provided, relatively or absolutely, in flat country, in the mountains, and in a few seaside resorts.

II. REST AND WORK.—*Systematic regulation of rest and exercise is the second—and a very important—hygienic curative factor in pulmonary tuberculosis.* As is well known, continuous, almost absolute rest was set up as an axiom by Dettweiler and his followers. In this there was certainly an element of error of the same order as in the recommendation of excessive and indiscriminate overfeeding of all consumptives. Rest that is too absolute and continued too long brings with it a slowing of all the vital processes, muscular atrophy, exces-

CLIMATOLOGIC INDICATIONS IN TUBERCULOSIS.**I. Tuberculous conditions in which moving of the patient is contraindicated.**

Acute tuberculosis.
 Tuberculosis with high fever.
 " " large cavities.
 " " cachexia.

II. Tuberculous conditions in which the mountains are:**Indicated:**

Anemic tuberculosis.
 Juvenile "
 Afebrile "
 Neurasthenic "

Contraindicated:

Tuberculosis with heart disease.
 Senile tuberculosis.
 Febrile tuberculosis.
 Tuberculosis with neurosis.
 " " erethism.

III. Tuberculous conditions in which the sea-coast is:**Indicated:**

(a) Northern coast resorts.	{	Osteo-articular, juvenile, and lymphatic forms.
(b) Intermediate coast resorts.		Tuberculosis with erethism.
		" " hyperemia.
(c) Southern coast resorts.	{	" " nervousness and excitement.
		" " fever.
		Chronic tuberculosis running a slow, torpid course (catarrh, chronic bronchitis).
		Tuberculosis in the aged.
		" " children.

Contraindicated:

The remainder.
 Sluggish forms.
 Tuberculosis with asthenia and depression.
 Tuberculosis running a rapid course.
 Hypersthenic tuberculosis.
 Tuberculosis with hyperemic tendencies.
 Tuberculosis of the irritable type.
 Tuberculosis with hemoptysis.

IV. Tuberculous conditions in which low altitudes are:**Indicated:**

Tuberculosis with erethism.
 " " hyperemia and hemoptysis.
 " " fever.
 " of the irritable type.

Contraindicated:

Tuberculosis with asthenia.
 " " depression.

sive fat deposition, and a manifest diminution of the powers of resistance to all morbid agencies. The tuberculous subject has need, more than other individuals, at the proper time, to be "retrained" by accurately regulated exercise.

The rest cure lowers and regularizes the temperature, reduces heart acceleration and dyspnea, and is often sufficient to arrest hemoptysis in the tuberculous. It is the best, most certain and least dangerous of antipyretic agencies in these cases. It is imperatively required in all tuberculous subjects with fever.

Its duration should vary, and be governed in tuberculous subjects by the temperature, heart-rate, and hemoptysis. After three weeks' time, it is well to combine with it the practice of massage, Swedish gymnastics, and active and passive movements carried out in the horizontal position.

These exercises result in activation of the circulation, improvement of nutrition and respiration, a building up of the muscles, atrophy of which is thus prevented, and alleviation of the feeling of weakness which leads the patients to say and the laity in general to believe that staying in bed has a depressing and fatiguing effect, which is partly true.

In tuberculous subjects, if the temperature has been normal for two days (below 37.2° C.—99° F.—by the rectum, morning and evening); if pulse acceleration is slight or absent (below 80), and if there is no hemoptysis, the patient may get out of bed in the daytime and recline on a couch.

After ten days of complete apyrexia, he may pass into the second stage: **Relative rest with moderate exercise, systematically regulated.**

The first few days, he may leave his couch to carry out a few manual tasks in his rooms, cleanse himself, take his meals at a table, etc.

One week after this test, if apyrexia persists, the patient should be allowed to leave his room to take walks of very gradually increasing length and duration, over flat ground, well sheltered from the wind. These walks are to be regulated by observation of the temperature and pulse. The patient, after having taken his pulse and temperature, should take an initial test walk of about 200 meters (650 feet) and take his pulse and temperature again; if the temperature has risen by more than 0.5° C. (0.9° F.) and if the pulse-rate has gone up more than 12 beats per minute, the absolute rest treatment should be resumed for forty-eight hours, after which the test should be repeated; if the pulse has not gone up more than 10 beats, if the temperature has not risen as much as 0.5° C., and if the pulse and temperature have returned to their original figure in less than an hour, the patient may be allowed, on the succeeding days, walks of 400, 600, 800, 1000, 1200 meters, etc. (1300 to 3900 ft.), increased by 200 meters a day up to 4 to 6 kilometers (2½ to 3¾ miles).

There is no need to take walks longer than this; later, two walks a day may be allowed—one in the morning and the other in the afternoon—making 8 to 12 kilometers (5 to 7½ miles) a day. The best time is in the morning, half an hour after breakfast, and in the afternoon, one to 1½ hours after lunch, if the temperature permits—which depends mainly on the locality, season and the amount of shade and hilliness of the walks available. These walks should always be interrupted by periods of rest, sitting down, for five to fifteen minutes, during which the patient should take care not to catch cold, taking along with him a coat or cape.

The selection of the walks and the regulation of their extent, duration and interruptions should preferably devolve on the physician, who, provided with diagrams of the town or resort, should map out thereon a gradual and carefully worked-out program (orientation, direction of the sun and wind, degree of ascent, dust, rest and shelter, shade, etc.), to which the patient is to conform.

In the stage of apyrexia, **moderate indulgence in various sports** acts favorably, *e.g.*, slow bicycling on flat or but slightly inclined ground, skating, bowling, croquet, billiards, etc.

When recovery seems established, the patient may be allowed to carry on various manual pursuits. Among these, gardening and moderate wood working seem especially desirable.

Paterson and the English school have systematized this "work cure," dividing it into five grades, each occupying three weeks' time.

The first grade consists in carrying a weighted basket 80 times a day a distance of 50 meters up a rise of 4 meters. The weight carried is 12 pounds the first week, 18 the second and 24 the third.

In the second grade, the patient is called upon to fill with a small shovel a cart holding 2½ to 5 cubic meters, taking four hours to do the work.

In the third grade, the small shovel is replaced by an ordinary one, and the amount of earth to be loaded is increased to 8 cubic meters.

In the fourth grade, work with a pickaxe is superadded.

In the fifth grade, the working time is increased to six hours (!).

Selection of this type of work was made because of the fact that it brings into play mainly the muscles of the chest.

The "systematization" involved in the above treatment takes away from it all value except as a standard applicable only in a sanatorium and to some selected cases of tuberculosis, free of fever and with particularly good endurance, as is the case in the Frimley sanatorium.

In the ordinary treatment of tuberculosis this procedure is nearly always inapplicable, certainly excessive, and frequently dangerous.

It is well, however, to bear in mind the suggestion thus given of the utility of exercise, of systematic and progressive work in tuberculous subjects free of fever and sufficiently robust.

* * *

Obviously, the foregoing considerations apply also to **mental work**, which should be reduced to a minimum, and the resumption of which should be at least as gradual as that of the physical activities.

Sexual excitation is frequently present in the tuberculous. Possibly the tuberculous process can in itself induce sexual stimulation and potency, but the mode of life, the idleness, the isolation or, on the contrary, the bringing together of the sexes, flirting (in sanatoriums), the overfeeding, the reading, and the dorsal recumbent position are probably the main factors.

The medical attendant should strive by judicious psychotherapy to restrain this pernicious excitation. He should select the reading matter, overcome idleness by suitable occupations, as already mentioned, endeavor to suppress flirting, recommend lateral decubitus and, if necessary, have recourse to valerian, the bromides and camphor.

* * *

Sabourin regards as very beneficial **exercises calculated to develop lung expansion**. Two or three times a day the patient, preferably in the sitting position, with his watch in his hand, executes in five minutes a predetermined number of inspirations at regular intervals, at the rate of about ten to twelve a minute. The air is taken in preferably through the nose, and the patient must learn to inspire from below upward, *i.e.*, by filling first the lower and middle portions of the chest, and dilating and elevating the upper portion only at the close of the inspiration.

Many patients with flat chests gain in chest expansion by carrying out these simple respiratory maneuvers.

One should **beware** of lung exercises combined with rhythmic movements of the arms, especially in erethistic, febrile and congestive patients. Respiratory gymnastics retain all their value, however, in cases of pretuberculosis and in those predisposed to the disease (see Part II: *Respiratory Gymnastics*).

III. DIET.—The following section is based on the work by Martinet and Le Gendre, entitled "*Les Régimes usuels*."

Diet in Tuberculosis.—When the curative dietetic-therapeutic conception: "Overfeeding, open air and rest" for tuberculosis was first popular-

ized, overfeeding was practised without limitation, systematic and indiscriminate gavage of all tuberculous subjects was instituted and, with the co-operation of the public, enormous dietary régimes were ordered. Patients at rest were seen to ingest overwhelming amounts such as 400 to 600 grams of meat, 12 to 20 eggs, and an aggregate of 4000 or 5000 calories a day. A few consumptives recovered *notwithstanding* this régime, while the greater number succumbed to intoxication. Thereupon, as the result of an equally exaggerated reaction, meat was interdicted by many, and even a vegetarian diet recommended by a few, with the ultimate result of imposing famine diets, just as harmful—though for different reasons—as the earlier toxic régimes. Much additional investigation and accumulated clinical observations have brought back the dietetics of tuberculosis to common sense rules and moderation, and have demonstrated that *denutrition and overnutrition are both unfavorable influences in this disease.*

The quantity and composition of the diet should be methodically determined for each case, mainly on the basis of the following five clinical factors:

1. Ratio of the weight to the normal weight.
2. The digestive capacity of the patient and his gastro-intestinal deficiencies.
3. The activity and extent of the pulmonary lesions and the degree of fever.
4. Extrapulmonary localizations in the kidneys, liver and vascular system.
5. In a measure, the personal likes and dislikes of the patient, which standard diets fail to take into account.

* * *

Diet in Tuberculosis According to the Ratio of the Weight to the Normal Weight.—1. **Where the Weight is below Normal.**—Experience shows that gain in weight is one of the most constant accompaniments of improvement. The attendant, therefore, should set about increasing the patient's diet above the ordinary maintenance diet. The observations referred to above show that the best results are obtained with moderate daily amounts only slightly exceeding the normal ration. The maintenance diet for the normal adult may be put down as requiring 30 to 33 calories per kilogram (2.2 pounds) at complete rest and 35 to 40 calories at comparative rest. Experience shows that in the tuberculous subject the optimum daily allowance (*i.e.*, that which insures the maximum of sustenance with the minimum of drawbacks) is about 35 to 40 calories in absolute rest and 40 to 45

calories in comparative rest; these figures, which are only approximate, are subject to modification on the basis of individual clinical results. Fifty calories appears to be the limit which cannot be exceeded without risk.

The following régime affords a practical standard for the over-feeding of a tuberculous subject 170 centimeters (5 ft. 7 in.) tall, free of fever and with normal digestive capacity.

The mineral substances are represented in the milk, bread, potatoes and eggs. Salt may be allowed as a condiment; there is advantage in adding to it powdered calcium phosphate, on account of the calcium it affords.

SUPERALIMENTATION MENU FOR A CONFIRMED OR SUSPECTED TUBERCULOUS
SUBJECT FREE OF FEVER AND WITH NORMAL DIGESTION (5 ft. 7 in. tall).

	Amount.	Proteins.	Fats.	Carbo- hydrates.	Calories.
8 A.M.					
Milk	400 c.c.	14	16	20	290
Roll	50 Gm.	3	—	30	130
Butter	12 Gm.	—	11	—	100
Honey	40 Gm.	—	—	30	120
10 A.M.					
Juice of 100 grams of meat (or 1 tablespoonful of special products)	—	20	—	—	80
NOON.					
Olives	80 Gm.	—	12	—	108
Roast filet of beef	100 Gm.	20	8	—	152
Potatoes	100 Gm.	2	—	18	180
with butter	10 Gm.	—	10	—	90
Two spoonfuls of apple com- pote	—	—	10	—	40
½ bottle of beer	400 c.c.	—	—	—	140
Bread	100 Gm.	6	—	60	260
4 P.M.					
Eggnogg made with 2 egg yolks, 30 grams of sugar and 75 c.c. of muscatel wine	—	10	12	35	350
7 P.M.					
One plateful of pea soup	130 c.c.	5	1	12	74
Roast chicken	90 Gm.	20	2	—	100
Macaroni (3 spoonfuls)	90 Gm.	6	—	60	260
Orange with sugar	—	—	—	20	80
Bread	100 Gm.	6	—	60	260
One glass of marsala	—	—	—	—	130
EVENING OR NIGHT.					
Milk	200 c.c.	7	8	10	140
		120	90	380	2985

2. **Where the Weight is Normal or above Normal.**—If the tuberculous patient has regained his normal weight, and particularly, if his weight is above normal, the above diet should be reduced so as to

approximate the normal allowance. It is rational to endeavor to get the patient's weight 2 or 3 kilograms (4.4 or 6.6 pounds) above normal, but clinical experience teaches that it is harmful to push the gain of weight beyond this.

When this limit has been reached, the aim should be merely to keep the tuberculous subject in a condition of nutritive balance; this is effected by testing, the former allowance being reduced. In general, the maintenance allowance of the consumptive is slightly above the normal; it seems that there is advantage in keeping the allowance of proteins and mineral substances somewhat higher.

In the preparation of the menus, many contingencies require, in practice, to be taken into account: The rational use of left-over food, *e.g.*, among those in poor circumstances; the case with which the food may be procured, the season of the year in the selection of vegetables and fruits, etc.

Whatever be the diet instituted as regards quantity, quality and distribution, it must undergo modifications in accordance with the course followed by the disease; in practice, it is subject to clinical observations, *viz.*, the changes in the body weight, the temperature, the condition of the urine, and the patient's general condition.

* * *

Diet in Tuberculosis According to the Temperature.—The temperature in tuberculosis may be normal, *e.g.*, in recovered cases or in certain torpid forms; subnormal, for the greater part of the day, as in very anemic, very emaciated or cachectic patients, or above normal, as in the majority of active tuberculous cases. It is well to make a distinction between the cases with slight fever (below 38.5° C.—101.3° F.—by the rectum) and those with moderate or high fever (above this level).

If the temperature is normal, the rules previously set forth should be adhered to, chiefly on the basis of the body-weight and the condition of the urine and the digestive tract.

If the temperature is subnormal, with a tendency to cooling of the body and shivering, it will be very useful to administer in the course of the day, either in the intervals between the main meals, or during these meals, as beverages, some hot wine or other hot alcoholic drinks, weak tea with the addition of brandy, etc. The feeling of warmth thus afforded, a slight degree of excitation, the disappearance of dazzling sensations and a general feeling of stimulation will indicate that the

desired result has been attained, and no other dietetic or pharmaceutical measure procures it as readily or as rapidly.

At the meals only light wines may be used. In cases with marked weakness it is allowable to use as diffusible stimulants, champagne or brandy as such or mixed with tea, coffee or milk.

If the temperature is moderately febrile (below 38.5° C.) and the digestive functions are not impaired, the instructions previously described should be adhered to. Frequently, the temperature will gradually descend and return to normal while the general condition is improving; in the opposite event, the dietary management should be the same as in high fever.

If the temperature is high (above 38.5° C.), the digestive functions are nearly always impaired, the appetite diminished, digestion laborious, and assimilation reduced. Here the problem of diet is particularly arduous, since one is called upon to institute an allowance above the normal in order to make up for the expenditures attending the consuming fever, on the basis of a digestive system with reduced functions. Sometimes the desired results can be obtained:

1. By distributing the food in numerous, small but highly nutritious meals, separated by sufficient intervals.

2. By using the best selection of foods, suitable for their high nutritive power and easy digestibility and assimilation.

1. Experience shows that the minimum interval between meals should be three hours; the food allowance may thus be distributed in six or seven meals, *e.g.*, at 7 and 10 a.m., 1, 4, 7 and 10 p.m., and if necessary, in the night.

2. The most highly nutritious and digestible foods should be used:

Red meat, ground or chopped meat, meat juice, peptones and proteoses.

Eggs, egg yolks.

Milk, milk preparations, curdled milk, kephyr, cream, butter, cheeses.

Purées of leguminous vegetables, macaroni, etc., rice, flour preparations, predigested soups.

Cereals, bread, crackers, biscuits, gluten.

Fruits, jams, marmalades, compotes, fruit confections.

Wine, beer, wine and sugar. Chocolate.

The physician and the associates of the patient should pay the utmost attention and exercise the utmost patience to avoid the seriously harmful effects of denutrition from relative inanition and of digestive disturbances from inopportune overfeeding.

Diet in Tuberculosis According to the State of the Digestive Functions.—The attendant most often has to contend with anorexia, dyspepsia, liver insufficiency, diarrhea and vomiting.

Anorexia is almost the rule, at least at the onset of tuberculosis. It is often associated with hyposthenic dyspepsia. It should be combatted by the open-window treatment; by moderate exercise in the open air; by the distribution of the food allowance in frequent small meals; by the moderate use of savory, tasty food and of condiments, foremost among which are to be considered salt and lemon juice; by the judicious administration, ten to fifteen minutes before meals, of a small cupful of beef bouillon, chicken or veal bouillon, or meat extracts (Valentine's, Liebig's, etc.); by suggestion, mental training, etc., and by the use of medicinal injections (sea water, cacodylates, etc.).

Dyspepsia, when not the result of excessive and poorly regulated feeding, *i.e.*, when it is a *primary tuberculous dyspepsia*, is generally of the hyposthenic, hypopeptic, hypochlorhydric type, and is, as a rule, manifested in anorexia, aversion to food, a feeling of weight in the stomach, palpitations, malaise after meals, etc.

The rules of feeding are those of hyposthenic dyspepsia (*q.v.*). *It is particularly advisable:*

1. To avoid fats and rich sauces, which inhibit gastric secretion.
2. To start the meals with the articles that are gastric stimulants (bouillon, meat extract, lean ham, smoked tongue, oysters).
3. To insist on thorough mastication and remember that, in general, hyposthenic subjects digest starches well.
4. To use acid or salty condiments (lemon juice, salt, etc.).
5. To use predigested dietary preparations: Peptones, starchy foods (soups) previously subjected to the action of the amylopeptic ferments (sprouted barley), curdled milk, kephyr, koumiss, etc.
6. It is a matter of common observation that digestion is sometimes facilitated by the ingestion of brandy after the meal. This practice is not to be systematically advised, but may be allowed temporarily.

Secondary dyspepsia due to overwork of the stomach (overfeeding or gastritis medicamentosa), a frequent and prejudicial condition, is accompanied by congestion of the liver, intestinal dyspepsia, etc.; in short, it affords a good example of total gastro-intestinal insufficiency, with impaired nutrition and toxic manifestations.

Rest for the gastro-intestinal tract and detoxicant treatment must be instituted at once: A milk and hydrocarbon diet, when well tolerated, meets this indication rather well, and to obviate the neurovas-

cular depression, sometimes marked, which this treatment frequently causes, black coffee with sugar may be allowed in addition.

One and a half liters of milk, 80 grams of cereal flour, 80 grams of rice, and 80 grams of sugar represent 74 grams of protein, 60 grams of fats, 266 grams of carbohydrates, and 1900 calories, and constitute a very acceptable allowance for an adult weighing 60 kilograms (132 pounds) who is completely at rest. It may be varied by the addition of coffee or tea, bread, biscuits, jam and fruits, curdled milk or kephyr.

Later, one should be guided by the results obtained for the resumption of eggs, legumins, and subsequently, of meat.

Diarrhea is a frequent incident and sometimes a serious accident.

It may be of *pharmaceutic origin* (creosote, arsenic, etc.).

It may be of *alimentary origin*, being induced by overfeeding, by an exaggerated allowance of protein food, especially of animal origin, or by the ingestion of some toxic food (shellfish, preserved meats, meat juice, etc.); this form can generally be warded off by reduction of the protein allowance.

It may be of *infectious origin*, being secondary to the gastro-enteritis which is usually associated with the gastric dyspepsia already referred to. A diet of milk and hydrocarbons and, if need be, an almost exclusive hydrocarbon diet, mitigated, if required, by the addition of a few spoonfuls of meat juice, peptones, curdled milk or wine with sugar, becomes necessary in such cases.

It may be of *tuberculous origin*, being dependent upon tuberculous ulcerations of the bowel. This form of diarrhea is at the present time beyond the resources of medical art. Yet it seems sometimes to be influenced, at least temporarily, by feeding with the lactic derivatives of milk, particularly curdled milk or kephyr.

Vomiting is ordinarily the result of one of the following three causes:

1. Gastric hyperesthesia with reflex vomiting, which yields to suggestion, the administration of a sedative preparation (chloroform water, cocaine, milk of bismuth) and the usual antidyspeptic régime.

2. Vomiting from an overworked, dilated, distended stomach with insufficient secretion and motility. Its treatment is similar to that of the hypomotor and hyposecretory dyspepsia already referred to.

3. Vomiting induced by paroxysmal, spasmodic cough.

The rôle of the diet in the latter form is limited to the exclusion of all irritant substances (undiluted wine, condiments, acids, etc.) and recommendation of the frequent ingestion of small swallows of water.

The Diet Indicated on Account of Certain Complications.

In **hemoptysis**, it is safest to feed the patient with liquids—bouillon, milk, soups and eggs (fruits, acid drinks and marmalades may also be recommended)—and to distribute the daily food allowance in small amounts taken at regular intervals. Sabourin blames iced drinks for the production of dangerous congestive reactions; the fluids should, therefore, be prescribed merely cold, cool or barely lukewarm.

If a hemorrhage, by its very copiousness, leads to intense depression, one is justified in using as a diffusible stimulant alcohol, in the form of liquors, hot wine, champagne, etc.

Slight **albuminuria** necessitates no special diet. The pronounced albuminuria of tuberculous nephritis should lead to treatment of the tuberculous subject as if he were a case of Bright's disease.

A tuberculous patient whose liver is insufficient may show *small amounts of sugar* in his urine; the diet should aim to spare the liver by restricting the protein allowance. For the diabetic consumptive, the diet is that of the consumptive stage of diabetes.

MEDICINAL TREATMENT.

The majority of experienced phthisiologists, particularly those, *e.g.*, Küss and Sabourin, who direct sanatoriums, manifest the greatest skepticism as regards the medicinal treatment of tuberculosis.

"Pharmaceutic agents are to some extent effective in pulmonary tuberculosis, but their efficacy is only partial, incomplete, uncertain and always inadequate, and they must therefore be relegated to the background. This is the view which appears to me most closely to approximate the truth" (Küss). This is, indeed, a view of fundamental import in the treatment of the disease.

It is no less a fact that a drug given at the wrong time is too often seriously harmful to the tuberculous—and that one benefits a consumptive oftener by delivering him from the harmful influence of drugs than by prescribing the most wisely constructed formula.

Nevertheless, many medicinal agents that have been subjected to prolonged test are capable of being useful adjuncts. Unfortunately, none is a specific, but some are of great utility, *e.g.*, the arsenicals, strychnine, iodotannic preparations, lime salts, etc., and, in general, the agents concerned in tonic medication.

That the hygienic agencies are of far greater significance than the medicinal agents there can be no doubt; that the risk from the latter is great when they are used by the inexperienced is obvious; but, as

Duclaux remarked, one should not reason like a "szkopzoi" and deprive himself of a serviceable practice through fear of thoughtless abuse.

The following medicinal agents, properly administered in suitable cases, are capable of giving great service:

1. The *arsenicals*, particularly the methylarsenates.
2. *Iodine* preparations, and more especially the *iodo-tannic* preparations.
3. The *salts of calcium*, and remineralizing agents in general.
4. *Strychnine*.
5. *Creosote* and its antiseptic substitutes.
6. *Tannic acid*.
7. *Codliver oil*.
8. Various *organotherapeutic agents*, more particularly suprarenal extract, meat juice and hemoplas.

MISCELLANEOUS SYSTEMATIC TREATMENTS.—By systematic treatments or medications I mean those which are instituted for curative purposes, with the idea of acting, not on some definite symptom, but on the morbid process itself. The attempts at serum treatment, as well as general hygiene, constitute systematic types of medication.

Systematic treatments that have been touted and applied with more or less success in pulmonary tuberculosis are innumerable; mention will here be made only of those which have resisted the assaults of time and appear, when correctly applied, to exert a favorable action on the course of the tuberculous disease.

All of them, whether of a purely dietetic or medicinal nature, seem to act mainly by modifying the "soil" or system, rendering it relatively refractory to the development of the tubercle bacillus and favoring fibrous change in the tuberculous lesions already present.

* * *

Zomotherapy.—The administration of **raw meat** or meat juice for curative purposes in tuberculosis has long been advised. Already in 1865, in a report presented before the Académie des sciences, Fuster, of Montpellier, recommended the treatment of tuberculosis with raw meat and alcohol, which he administered in daily amounts of 100 to 300 grams of raw meat and 100 grams of alcohol. The experimental results obtained by Richet and Héricourt in 1899-1900 with raw meat juice aroused considerable enthusiasm; *zomotherapy* was instituted, and for a time it was thought that the long sought specific treatment for tuberculosis had been

found. This idea, however, had to be given up. All clinicians agree at the present time that *raw meat and the juice of raw meat are useful adjuncts in the treatment of pulmonary tuberculosis; they may render appreciable service in daily amounts of 100 to 200 grams, provided, however, that they are well tolerated and that the digestive tract, liver, kidneys and cardiovascular system are unimpaired; it is, therefore, well to be particularly sparing of these products in the aged, in cardiorenal, hepatic and sclerotic cases, and in the fibroid forms of tuberculosis; the amounts of 500 grams or more advocated by Richet and his followers are always attended with danger.*

Remineralization.—Long-standing empirical considerations, numerous clinical observations, clinical study of normal and tuberculous lungs and of the urine of tuberculous cases, and pathologic study of the processes of recovery in tuberculous lesions have since a long period led investigators to attach the greatest importance to the tuberculous "soil" and to loss of the mineral constituents, especially phosphatic and calcic, in tuberculous patients. Attempts at *systematic remineralization* by the administration of phosphates and glycerophosphates of calcium constituted the therapeutic application of these observations.

Theoretically, the general principles appertaining to the treatment of the demineralization of consumptives and pretuberculous subjects are very simple. They resolve themselves, indeed, into the suppression of all the accessory causes of demineralization and the restitution to the tissues of the necessary substances previously lost to an excessive degree. Practically, however, these desiderata are extremely difficult to bring about.

In the first place, remineralization consists in eliminating the accessible causes of demineralization, *viz.*, in reducing the formation of acids in the system (treatment of acid dyspepsia and of gastric stasis, administration of a diet yielding little in the way of acids, etc.) and in neutralizing with the metals of the alkaline earths (calcium and magnesium) the acids already formed. One should, in addition, be able to detect and correct the underlying disturbance which, aside from acidosis, ends in the demineralization of pretuberculous subjects and established cases of the disease. What this metabolic disturbance is, however, we do not as yet know.

In the second place, it is necessary to restore to the tissues in an assimilable form the substances which they are losing in excessive amounts and which they are withdrawing, by way of defence, from the organic reserve deposits, particularly in the bony tissue.

Nothing seems easier than to administer to these patients in medicinal forms the phosphoric acid, lime, magnesia and silica which

they are losing; but the practical results do not confirm the accuracy of this relatively simple view.

Remineralization is subject to certain general principles, which are these:

(a) *Remineralization is not effected by merely supplying inorganic substances, which the system fails to fix.*

(b) *Remineralization does not occur if there is a permanent production of acids in the system.*

(c) *Remineralization is not effected if the subject is feeding himself on acid products, even if oxidizable, or with products which form acids in the course of their chemical changes in the system.*

(d) *It is easier to prevent demineralization than to remineralize.*

(e) *Any remineralizing agent which concurrently increases the respiratory interchanges should be excluded.*

(f) *Remineralization must go hand in hand with improvement of general nutrition.*

This remineralizing medication has been reduced to a concrete plan, at least as regards its recalcifying aspect, by Ferrier under the term "recalcifying medication." The two practical measures entailed in the latter are as follows:

1. Exclude from the diet acids (vinegar, wine, acid fruits, cider, perry, etc.) and acid-forming foods (fatty articles, sauces, etc.).

2. Administer with a calcium bicarbonate mineral water (such as Saint-Galmier or Saint-Léger) a powder of the following type:

℞ Calcii carbonatis	0.5	gram (gr. viiss);
Calcii phosphatis	0.2	gram (gr. iij);
Magnesii oxidi,		
Sodii chloridi	āā 0.15	gram (gr. iiss).—M.

In an empiric manner, and since the earliest times, the various salts of calcium, such as calcium phosphate, calcium glycerophosphate and calcium carbonate have, with good reason, formed part of the treatment of tuberculosis.

The diet is, however, the most potent remineralizing agency at our disposal. *Calcium* is found in eggs, milk, beans, cabbage, asparagus, strawberries, oranges and figs. *Magnesium* is contained in eggs, brains, sweetbread, Brussels sprouts, potatoes and chestnuts. *Phosphorus* has been isolated from eggs, milk, fish, cheese, fish roe, dried vegetables, carrots, almonds, figs and dates. *Iron* is a component of eggs, red meats, dried vegetables, rice, asparagus, turnips, Brussels sprouts, green salads and spinach; apples, pears, strawberries and plums also contain iron. *Silica*, also a valuable substance, occurs in beans, green salads and cauli-

flower. Finally, *iodine* occurs in shrimps, lobsters, string beans, carrots, rice, pineapples, strawberries, etc.

Lastly, it should be mentioned that recalcification, or at least the retention of calcium in the system and its fixation in the tissues, seems to be favored by the concomitant action of adrenalin, of fluorine and of pancreatic organotherapy, which may therefore be rationally combined with the calcium given.

Treatment with the Salts of the Rare Earths (Sulphates, of Samarium, Neodymium and Praseodymium).—Grenet and Drouin have experimented with these salts, giving alternate series of twenty intravenous injections of 0.02 to 0.05 gram ($\frac{1}{3}$ to $\frac{1}{4}$ grain) each (1 to 2.5 cubic centimeters of a 2 per cent. solution). This treatment seems to act by directly influencing the bacillus and by causing a lymphocytic reaction in the system. It is essential that this treatment be reserved for the definitely chronic (afebrile) cases. It appears to be poorly borne in the acute or subacute (febrile) cases.

The above conclusions have been generally confirmed by Rénon, Sergent and Pissavy.

Hudelo and Adelman have treated a number of cases of tuberculous lupus, lupus erythematosus, erythema induratum, glandular involvements and scrofulo-tuberculous swellings by the method of Grenet and Drouin; they obtained no complete cures, but a large proportion of cases of improvement, some slow and slight and others striking and progressive.

Unfortunately, 25 per cent. of the cases treated exhibited *reactions*, among which 15 per cent. may be described as really *serious*. In the course of the treatment or during the intervals, there was observed an abrupt appearance and rapid development of reactions, sometimes local, in the lesions under treatment, at other times at a distance and consisting generally in the sudden reawakening of tuberculous lesions, even in internal organs (albuminuria, hemoptysis), which had been wholly latent up to that time.

These substances are used:

(a) By intravenous injections of 2 per cent. solutions of the three salts in daily amounts of 2 to 4 cubic centimeters (30 to 60 minims) in courses of twenty injections with intervening twenty-day periods of rest.

(b) By hypodermic injections of 2 per cent. solutions in a lipiodic menstruum in daily amounts of 2 to 4 cubic centimeters.

The **arsenicals** act powerfully on cell nutrition and on blood formation, exert a general stimulating action on the system, and are, therefore, extremely serviceable in the early stages of pulmonary tuberculosis. Details concerning their administration will be found in the section on *Arsenic* in Part I. They should be employed in periods of seven to ten days, separated by intermissions of like duration, in daily amounts of 0.01 to 0.02 gram ($\frac{1}{6}$ to $\frac{1}{3}$ grain) in the case of *sodium arsenate* and *potassium arsenite* and of 0.04 to 0.1 gram ($\frac{2}{3}$ to $1\frac{1}{2}$ grains) in the case of *sodium cacodylate* (sodium dimethylarsenate) and *arrhénal* (sodium monomethylarsenate).

Tannic acid has some reputation—probably not wholly justified—in the routine treatment of tuberculosis. It is badly borne by the stomach and intestine, inducing gastric or intestinal disturbances by reason of its astringent property, and causing pain, sometimes very pronounced.

The following cachets:

℞ Acidi tannici	0.2 gram (gr. iij);
Calcii phosphatis	0.4 gram (gr. vj).
Pone in cachet. No. i. Da tal. No. xxx.	
Sig.: To be taken, at <i>noon</i> and in the <i>evening</i> .	

are almost classic, if not altogether to be recommended, in the treatment of tuberculosis.

I am unable to state whether the cachets so often prescribed:

℞ Acidi tannici	0.3 gram (gr. v);
Calcii phosphatis	0.5 gram (gr. viiss);
Creosoti	0.25 gram (gr. iv).
Pone in cachet. No. i. Da tal. No. xxx.	
Sig.: To be taken two or three times a day.	

have ever cured a case of tuberculosis, but what I am certain of is that they have upset many a stomach and that, at least as far as the gastro-intestinal tract is concerned, their use often does serious harm.

One might instead give tannic acid in the form of *iodotannic syrup*, *iodotannic wine*, *iodotannic wine with phosphate*, or simply old Bordeaux wine.

Iodine and its compounds, currently used with comparative success in the treatment of tuberculous lymphadenitis, yield only indifferent or doubtful results when given by the mouth (as iodine, iodoalbuminates or iodotannic preparations) or hypodermically (in the form of lipiodol).

H. Dufour reported striking improvement in pulmonary tuberculosis of the bronchitic, fibroid type, running a slow course with relatively little fever, from daily intravenous injections of 2.5 to 5 cubic centimeters (40 to 80 minims) of an iodine compound (iodaseptin) containing 42 per cent. of iodine in combination with a benzomethyl compound and with hexamethylenamin.

This intensive iodine medication may, as a matter of fact, be carried out much more simply by the administration in ascending doses in the course of the day, in beverages during meals, or in milk, of the French official 10 per cent. tincture of iodine—an active, convenient and inexpensive preparation. The dose is to be increased daily by gradual and continuous progression. The really active daily doses of 100 or 200 drops or more may thus be reached.

As for **creosote and its derivatives** I agree with Rénon that these preparations, given as a routine to all tuberculous cases, are harmful, and that one may and should prescribe them only in the sluggish, afebrile, non-congestive forms and extensive pulmonary suppurations, in which they act as antiseptics, improve the bronchial secretions and promote fibrosis. They are absolutely contraindicated in the congestive, irritable, hemoptysic and febrile forms, and particularly in the forms accompanied by gastro-intestinal disturbances. Their field of application is restricted to the sluggish bronchial forms, merging clinically with chronic bronchitis.

Creosote should preferably be given by enema:

- (1) R̄ Tincturæ opii gtt. v;
 Creosoti 1 c.c. (m̄xvj);
 Vitelli ovi 1;
 Lactis 200 c.c. (f̄3vij).

M. Sig.: To be given warm as an enema, to be retained.

- (2) R̄ Tincturæ opii 1 c.c. (m̄xvj);
 Creosoti 10 c.c. (f̄3iiss);
 Saponis 10 grams (5iiss);
 Aquæ q. s. ad 150 c.c. (f̄3v).

M. Sig.: One tablespoonful in one-third glassful of warm water, to be used as enema.

Hypodermic injections of 1:15 creosote in oil in doses of 5 to 20 cubic centimeters (80 minims to 5 fluidrams) or more, as recommended by Burlureaux, are often very useful and in general well borne.

Codliver oil with creosote has always seemed to me to be poorly tolerated and *wines and elixirs with creosote* still worse.

Pure *guaiacol* (monomethyl ester of pyrocatechin), which constitutes 20 per cent. of creosote, is sometimes used with success as a substitute for the latter, either as such or in the form of the carbonate, phosphite, phosphate, benzoate or cacodylate of guaiacol in daily amounts of 0.2 to 0.5 gram (3 to 7½ grains) in capsules, codliver oil, elixirs, enemas or by hypodermic injection.

Potassium guaiacolsulphonate (thiocol) is very low in toxicity and is non-irritating to the digestive tract. It may be prescribed in daily doses of 2 to 6 grams (30 to 90 grains) in cachets, liquid preparations or enemas:

Cachets:

- R̄ Calcii phosphatis 0.4 gram (gr. vj);
 Magnesii oxidi 0.2 gram (gr. iiij);
 Thiocol 0.6 gram (gr. ix).

Pone in cachet. No. i. Da tal. No. xxx.

Sig.: Three or four cachets a day with the meals.

℞ Nucis vomicæ pulveris	0.01 gram (gr. $\frac{1}{40}$);
Arrhenal	0.02 gram (gr. $\frac{1}{40}$);
Calcii phosphatis	0.5 gram (gr. viiss);
Thiocol	0.6 gram (gr. ix).
Pone in cachet. No. i. Da tal. No. xxx.	
Sig. Two or three cachets a day.	

Liquid preparation:

℞ Thiocol,	
Sodii benzoatis	āā 4 grams (3j);
Syrupi codeinæ (N. F. IV),	
Syrupi terebinthinæ (10 per cent.)	āā 45 c.c. (f3iiss);
Syrupi senegæ	q. s. ad 150 c.c. (f3v).
M. Sig.: Three to five tablespoonfuls in the 24 hours.	

* * *

What has already been said concerning raw meat juice applies also to the use of **sea water**. It is sometimes a valuable and often a useful adjunct, but is in no wise to be considered a specific remedy for tuberculosis. Its use is especially indicated in the sluggish, afebrile cases featured by anemia, asthenia and anorexia. It is well to be particularly cautious in its use in irritable, congestive, febrile, dyspneic and hemoptysic cases, and even more so in patients with albuminuria or arteriosclerosis. In a new case whose reactive proclivities are unknown, the initial dose should never exceed 50 cubic centimeters (13 fluidrams).

As for *hypodermic injections of cane sugar* (Lo Monaco), at one time lauded to the skies in the daily press, they were very soon relegated, and by their sponsor himself, to the relatively unimportant rank of an adjunct measure having an inconstant favorable effect on the expectoration.

* * *

SYMPTOMATIC TREATMENT.—The *symptoms* the physician generally has to combat in the treatment of pulmonary tuberculosis are: Fever, cough, expectoration, hemoptysis, dyspnea, sweats, anorexia, dyspepsia, loss of weight, diarrhea and vomiting.

Most of these symptoms have already been considered in independent sections in Part III, to which the reader is referred.

Fever is an almost constant symptom in all tuberculous conditions running an active course. It presents itself especially under three circumstances: (1) In the *perituberculous congestive attacks* which are so frequent among the tuberculous, it is generally temporary, as are these attacks themselves. (2) In the process of *softening and caseation*, during which it often exhibits a continuous and extremely refractory type.

(3) In the *suppuration of cavities*, resulting in an actual suppurative fever, a hectic fever with large temperature oscillations.

The fever occurring in the congestive attacks is amenable only to hygiene, complete rest in bed, a regular, well-ordered and easily digested diet, and continuous aëration, as has already been mentioned. Under these measures such fever nearly always yields in a few days or weeks without any other treatment. If it should prove persistent and refractory, one might combine with them hydrotherapeutic procedures such as cool sponging, cold chest packs, and Priessnitz compresses (see *Physical Agents*), the application of which sometimes at first arouses some objections on the part of the family but which are soon accepted and carried out eagerly in view of the very satisfactory results.

The fever attending the process of softening is often particularly refractory and persistent, as is the pathologic process to which it is due. Here again, general hygienic measures, rest and hydrotherapy (especially the chest packs) are the procedures which give the best results and procure the greatest amount of relief. Yet, whatever he may do and whatever his personal opinion may be, it is practically impossible in this stage for the practitioner to avoid the use of medicinal antipyretics, even the best of which may be said not to be worth much. These drugs may, as regards tuberculous fever, be divided into two groups: Those which are inactive (*quinine* type), harmless and practically useless, and those which are active (*acetanilid*, *amidopyrin*, *acetylsalicylic acid*, *cryogenin*, *guaiacol*), toxic and attended with risk. The temporary, transitory reduction of temperature, which is devoid of any favorable action on the tuberculous process, is obtained only at the price of an actual general intoxication manifested by sweats, adynamia, low blood-pressure, and even collapse, jaundice, cyanosis or diarrhea—in short, of a more or less marked aggravation of the general condition.

Frequently, however, one is compelled to have recourse to such drugs: 1. Because simple expectant treatment by hygiene alone is practically impossible, at least in general practice, in the presence of a persistent and obstinate symptom (and the application of this is not limited to the fever of tuberculosis). 2. Because, when this fever, by reason of its height and constancy, interferes with the taking of food, the disadvantages of the antipyretics are less than those of inanition.

The following three axioms should be kept in mind:

1. Even the best antipyretic is always prejudicial in the fever of tuberculosis; it should be used only temporarily, evanescently and intermittently.

2. Since habituation sets in inevitably and rather rapidly, whatever antipyretic drugs be used, there is advantage in having at one's disposal a number of well-tested antipyretics which should be given in alternation.

3. The chemical antipyretics now available which prove effectual in the fever of tuberculosis are chiefly antipyrin, amidopyrin, cryogenin, acetanilid and maretin. Their dosage and modes of administration may be briefly recalled as follows (see also Part I: *Antipyretics*):

Antipyrin should be prescribed in solution to the amount of 1 to 2 grams (15 to 30 grains) a day, one-half to one hour before the time of the febrile movement. It may be given, *e.g.*, in Vichy water, 10 grams ($2\frac{1}{2}$ drams) to 150 cubic centimeters (5 fluidounces); each tablespoonful of this solution will thus contain 1 gram (15 grains) of antipyrin. Or:

℞ Antipyrinæ,
Sodii bicarbonatisāā 0.6 gram (gr. ix).
Pone in cachet. No. i. Da tal. No. xii.
Sig.: Two or three cachets in the 24 hours, along with a stimulating hot infusion.

Amidopyrin may be used in the form of amidopyrin camphorate, best borne in the daily amount of 0.6 to 1 gram (9 to 15 grains) in three divided doses. Thus, 0.25 gram (4 grain) capsules of amidopyrin may be ordered, two or three to be taken in twenty-four hours. Or:

℞ Amidopyrinæ 2.5 grams (gr. xxxviii);
Syrupi aurantii amari 45 c.c. (f̄3iiss);
Aquæ destillatæq. s. ad 150 c.c. (f̄3v).
M. Sig.: Two or three tablespoonfuls in the 24 hours.

Cryogenin (metabenzamino-carbazide) should be prescribed to the amount of 0.4 to 0.6 gram (6 to 9 grains) on the first few days and in diminishing doses later. Thus, 0.2 gram (3 grain) capsules of cryogenin may be ordered, of which 2 or 3 are to be taken on the first two days, 2 on the next two days, 1 on the following two days, and thereafter every two or three days.

Acetanilid is a strong antipyretic, but exposes the patient to cyanosis, subnormal temperature and collapse; it may be used cautiously to the amount of 0.5 to 2 grams ($7\frac{1}{2}$ to 30 grains) in the twenty-four hours. [Special caution with the larger amounts.—Tr.]:

℞ Acetanilidi 5 grams (gr. lxxv);
Elixiris aromatici 80 c.c. (f̄3iiss);
Spiritus vini vitis 15 c.c. (f̄3ss);
Aquæ destillatæq. s. ad 150 c.c. (f̄3v).
M. Sig.: One to four tablespoonfuls in the 24 hours.

To obviate the depressant, hypotensor, sudorific action of most of these compounds they may be prescribed with an infusion of sage (*Salvia*, U. S. P. VIII) or even of coffee if there is no excitement, and may be combined, if need be, with neurocardiac tonics, such as *nux vomica*, strychnine, sparteine or cinchona, as in the following formula:

℞ Strychninæ sulphatis	0.01 gram	(gr. $\frac{1}{6}$);
Sparteinae sulphatis	0.25 gram	(gr. iv);
Amidopyrinæ	2.5 grams	(gr. xxxviii);
Elixiris aromatici	150 c.c.	(f $\overline{3}$ v).

M. Sig.: One tablespoonful in a cup of hot infusion.

[Each tablespoonful contains 0.001 gram ($\frac{1}{60}$ grain) of strychnine, 0.025 gram ($\frac{1}{2}$ grain) of sparteine and 0.25 gram (4 grains) of pyramidon.]

There has also been recommended for the fever of tuberculosis—and I have used it a few times—the painting of 1 to 2 grams (15 to 30 grains) of *guaiacol*, liquefied by warming, on the skin over an area 10 to 20 centimeters square (4 to 8 inches square), which is then covered with cotton and oiled silk. Rapid (less than an hour) and pronounced (several degrees C.) reductions of temperature are thus obtained, but this is accomplished only at the cost of such weakness and sweating that I have given up the proceeding as too dangerous.

* * *

The treatment of **cough, expectoration, hemoptysis and dyspnea** has been dealt with in separate sections, to which the reader is referred (see Part III: *Treatment of Symptoms*).

Sweats, which constitute a reaction dependent upon the toxemia and adynamia, are both very distressing and very debilitating on account of the sleeplessness to which they give rise.

Belladonna and *atropine*, the latter in the dose of 0.00025 to 0.001 gram ($\frac{1}{260}$ to $\frac{1}{65}$ grain), are the real heroic remedies for exhausting sweats. The first-mentioned of these doses is a good one to start with, and may subsequently be increased if need be, the mode of reaction of the patient being duly taken into account. It should be given for three or four days in succession, next intermitted for the same number of days, and then resumed; habituation and the arresting action on the salivary and gastric secretions are thus avoided:

1. Granules of atropine sulphate, 0.00025 gram ($\frac{1}{260}$ grain) each; one to three in the evening, according to the tolerance and reaction of the patient.

2. ℞ Atropinæ	0.01 gram	(gr. $\frac{1}{6}$);
Glycerini	3.5 c.c.	(℥lvj);
Aquæ destillatæ	1.5 c.c.	(℥xxiv);
Alcoholis	q. s. ad 10 c.c.	(f $\overline{3}$ iiss).

M. Sig.: Ten to forty *drops* (not minims) according to tolerance.

[Fifty drops = 0.001 gram ($\frac{1}{60}$ grain) of atropine.]

3. R Tincturæ belladonnæ 10 c.c. (f3iiss);
 Tincturæ aconiti 5 c.c. (℥lxxv).
 M. Sig.: Twenty to fifty *drops*, according to tolerance.

Ergot is also used, frequently with benefit:

- R Extracti belladonnæ 0.01 gram (gr. $\frac{1}{40}$);
 Ergotæ 0.2 gram (gr. $\frac{1}{5}$);
 Extracti cinchonæ 0.05 gram (gr. $\frac{1}{40}$).
 Ft. pil. No. i. Da tal. No. xx.
 Sig.: One to three pills, according to effects.

White agaric is a time-honored remedy:

1. R Extracti belladonnæ 0.01 gram (gr. $\frac{1}{40}$);
 Extracti opii 0.02 gram (gr. $\frac{1}{80}$);
 Agarici (N. F.) 0.2 gram (gr. $\frac{1}{5}$).
 Ft. pil. No. i. Da tal. No. xx.
 Sig.: One or two pills in the evening.
2. R Acidi agarici 0.005 gram (gr. $\frac{1}{12}$);
 Pulveris ipecacuanhæ et opii 0.1 gram (gr. iss).
 Ft. pil. No. i. Da tal. No. xx.
 Sig.: One or two pills in the evening.

[Agaricin is also used, in a dose twice that of agaricic acid.]

General rubs with turpentine in alcohol, Rosen's liniment, etc., are very useful.

Keeping the *window open* is sufficient in many tuberculous subjects to reduce markedly or even eliminate the night sweats.

* * *

As for the digestive symptoms, such as anorexia, dyspepsia, diarrhea and vomiting, the reader is referred to the earlier section on diet in tuberculosis. Only a few brief notations will be made here.

Anorexia is a common symptom and forms a serious obstacle to the dietetic treatment of tuberculosis. Its causes are many: Anemia, hypochlorhydria, nervous asthenia, etc.

The open air treatment, systematic feeding, stimulating rubs and properly regulated exercise in patients free of fever, are often sufficient to overcome this anorexia.

The arsenic compounds, strychnine, the bitters, meat extracts, malt extracts and sometimes phosphoric acid and peptones are in most instances highly effectual.

1. Daily hypodermic injections of sodium cacodylate or arrhenal, 0.05 to 0.1 gram ($\frac{3}{4}$ to $1\frac{1}{2}$ grains) in courses of six injections with an intermission for one week. Or:

2. \mathcal{R} Strychninæ sulphatis 0.03 gram (gr. $\frac{1}{4}$);
 Sodii arsenatis (N. F.) 0.08 gram (gr. $\frac{1}{4}$);
 Sodii glycerophosphatis (N. F.) 10 grams (5iiss);
 Extracti cinchonæ 20 grams (5v);
 Spiritus vini vitis 40 c.c. (f3x);
 Glycerini q. s. ad 150 c.c. (f3v).

M. Sig.: One teaspoonful three times daily before meals in a glass of water or other beverage.

3. \mathcal{R} Acidi phosphorici diluti 50 c.c. (f3xiiij);
 Sodii biphosphatis 20 grams (5v);
 Aquæ destillatæ 160 c.c. (f3vss).

M. Sig.: One or two teaspoonfuls before the noon and evening meals in a little sweetened water.

Or:

4. Shortly before a meal, one-half cupful of meat or chicken bouillon with addition of a little meat extract (Liebig's or Valentine's meat juice, carnin, etc.).

Or:

5. Elixir of peptone (preferably heart peptone). One dessert-spoonful ten minutes before meals.

* * *

Loss of weight, an early sign of tuberculosis, and the result of anorexia, dyspepsia or impaired nutrition, should be combated with rest, systematic and progressive feeding, and the correction of nutritional faults, as already described. Arsenic, glycerin, codliver oil and fats, when well borne, exert their action more especially against this symptom.

Codliver oil, when accepted and tolerated by the patients, and when it does not induce disturbances of gastro-intestinal digestion, constitutes a phosphorized and iodized fatty food of unquestionable value. It must be realized, however, that anorexia, dyspepsia, nausea, diarrhea, fever and congestion of the liver contraindicate its use.

The brown oil is the more active, but is also more nauseous and oftener poorly borne; the light oil is more commonly used.

* * *

Diarrhea may be of *pharmaceutic* or *alimentary* origin, or due to ordinary *infectious agencies* or to the *tubercle bacillus*.

Diarrhea of pharmaceutic origin is very common; if uncomplicated, it yields to the withdrawal of all drugs.

Diarrhea of alimentary origin is one of the commonest and most serious consequences of overfeeding. One day of restriction to water, purgation and a gradual return to a well-thought-out diet, with elim-

ination of all potentially toxic foods (shellfish, pork products, preserved meats, meat juice, etc.), prove sufficient treatment. In obstinate cases, a period of hydrocarbon diet (see Part I: *Dietetics*) and the concurrent administration of lactic ferments will overcome this symptom, and likewise the form of diarrhea due to ordinary infectious gastro-enteritis.

Diarrhea due to the tubercle bacillus, *i.e.*, the result of tuberculous enteritis, is at present beyond the resources of medical art. It may, however, be favorably influenced by the lactic milk derivatives, yoghurt, kephyr and koumiss. The diet should consist of gruels, purées, rice, scraped meat, eggs and lean ham, temporarily replaced by kephyr, koumiss or yoghurt if they are poorly borne.

Gastro-intestinal digestion should be helped out by the administration of *diastase*, *pepsin* and *pancreatin*.

Bismuth subsalicylate or *subcarbonate* in large doses, 2 to 10 grams (30 to 150 grains) or more; *methylene blue* in a daily amount of 0.15 to 0.2 gram ($2\frac{1}{2}$ to 3 grains), and *powdered opium* or Sydenham's white decoction sometimes favorably influence this symptom.

1. \mathcal{R} Bismuthi subcarbonatis 0.8 gram (gr. xij);
 Magnesii peroxidi 0.3 gram (gr. v);
 Opii pulverati 0.05 gram (gr. $\frac{3}{4}$).

Pone in cachet. No. i. Da tal. No. xxx.

Sig.: Two or three cachets a day one hour before meals.

2. \mathcal{R} Methylthioninæ chloridi 0.1 gram (gr. iss);
 Lactosi 0.5 gram (gr. viiss).

Pone in cachet. No. i. Da tal. No. xxx.

Sig.: Three or four cachets a day before meals.

3. \mathcal{R} Opii pulverati 0.1 gram (gr. iss);
 Methylthioninæ chloridi 0.05 gram (gr. $\frac{3}{4}$);
 Benzonaphtholis 0.3 gram (gr. v);
 Bismuthi subnitratiss 0.7 gram (gr. xj).

Pone in cachet. No. i. Da tal. No. xxx.

Sig.: Three or four cachets a day.

4. \mathcal{R} Tincturæ opii camphoratae 12 c.c. (f5iij);
 Bismuthi subnitratiss 10 grams (5iiss);
 Decocti albi (Sydenham) 300 c.c. (f3x).

M. Sig.: One wineglassful (70 c.c.— $2\frac{1}{4}$ ounces) at a dose.

[The formula of Sydenham's white decoction is as follows:

- $$\begin{array}{ll} \mathcal{R} \text{ Calcii phosphatis,} & \\ \text{Acaciæ} & \text{āā} \quad 10 \text{ grams (5iiss);} \\ \text{Micæ pani} & 20 \text{ grams (5v);} \\ \text{Sucrosi} & 60 \text{ grams (5ij);} \\ \text{Aquæ aurantii florum} & 10 \text{ c.c. (f3iiss);} \\ \text{Aquæ} & 1000 \text{ c.c. (f3xxxiv).—M.].} \end{array}$$

In long-standing or rebellious cases, and *a fortiori* in recent cases, the best results are sometimes obtained by a simple *intravenous injection of 5 cubic centimeters (80 minims) of a 5 per cent. solution of calcium chloride.*

* * *

Vomiting is generally due to one of the following three causes:

1. *Gastric hyperesthesia* with reflex vomiting, which usually yields to suggestion, the administration of a sedative, local anesthetic solution and the institution of an antidyspeptic diet:

1. ℞ Codeinæ 0.05 gram (gr. $\frac{3}{4}$);
Aquæ bromoformi 100 c.c. (f3iiss).
S. Sig.: One tablespoonful at a dose.

2. ℞ Cocainæ hydrochloridi 0.1 gram (gr. iss);
Aquæ chloroformi 100 c.c. (f3iiss).
S. Sig.: Two to four teaspoonfuls in a little sweetened water.

3. ℞ Stovaine 0.05 gram (gr. $\frac{3}{4}$);
Magmae bismuthi, (N. F.) 100 c.c. (f3iiss).
S. Sig.: One or two tablespoonfuls.

The ether spray, ice pills, and an ice-bag over the epigastrium may also be of considerable utility.

2. *Overburdening, dilatation and distention of the stomach* causes vomiting which should be treated in the same manner as dyspepsia with motor atony and reduced secretion, whence it arises.

3. *Paroxysmal, spasmodic cough*, causing vomiting the treatment of which is identical with that of "emetic cough" (see Part III: *Cough*).

Dysphagia.—Feldstein has given (*Presse méd.*, Sept. 3, 1921) the following useful outline of treatment for this symptom:

In dysphagia in tuberculous subjects, the pain on swallowing is often intense, radiating toward the ears. It is caused by *tuberculous laryngitis* involving either the upper ring of the larynx (epiglottis, aryteno-epiglottic folds and arytenoids) or the posterior aspect of the organ.

The pain is awakened either by the passage of food over the lesions or by the rubbing of the lesions against the posterior wall of the pharynx during the second phase of the act of deglutition.

A.—MEASURES WHICH THE PATIENT CAN APPLY HIMSELF.

1. *A few minor helpful procedures.*

Drink while lying on his stomach, through a tube.

Compress the ears with the palms of the hands at the moment of swallowing.

Propel the larynx forward with the finger-tips.

2. *Inhalation of protective or soothing powders.*

Several times a day (preferably ten minutes before meals), the patient inhales *abruptly*, through a bent tube passed directly into the throat, an amount of one of the following powders equivalent in size to a pea :

A

℞ Orthoform,
Acaciæ,
Lactosiāā 10 grams (3iiss).—M.

B

℞ Antipyrinæ 3 grams (gr. xlv) ;
Bismuthi subgallatis,
Acaciæāā 10 grams (3iiss).—M.

When the above powders lose their effect, the following powder should be used in the same way :

℞ Morphinæ hydrochloridi 0.25 gram (gr. iv) ;
Cocainæ hydrochloridi 0.5 gram (gr. viiss) ;
Lactosi,
Acaciæāā 10 grams (3iiss).

B.—MEASURES TO BE APPLIED BY THE PHYSICIAN.

1. *Intralaryngeal injections* of oil containing mint, anesthesin or chloretone; an inconstant anesthesia of short duration results.

2. *Deep galvanocauterization of the lesions*. This measure suggests the two-edged sword; sometimes it soothes, at other times it causes irritation.

3. *Injections of alcohol in the course of the superior laryngeal nerve*, the sensory nerve of the larynx. This is an excellent procedure; its effect lasts one or two weeks.

The needle of a hypodermic syringe is introduced in the median line, midway between the thyroid and hyoid, perpendicularly down to the thyro-hyoid membrane, which offers resistance. The needle is then tilted and inserted further in a direction parallel to the upper border of the thyroid cartilage, between the membrane and the thyro-hyoid muscle. After it has gone a distance of $2\frac{1}{2}$ centimeters (1 inch) a sharp pain indicates that the nerve has been reached; 1 cubic centimeter (16 minims) of the contents of the syringe is now injected, the needle partly withdrawn and, without taking it out of the skin, the maneuver repeated on the opposite side.

The following formula may be used:—

℞ Procainæ hydrochloridi 0.2 gram (gr. iij) ;
Mentholi 0.1 gram (gr. iss) ;
Alcoholi (80 per cent.) 24 c.c. (f3vj).—M.

(The procaine lessens the pain caused by the action of the alcohol for the first few hours.)

4. *Section of the superior laryngeal nerve* in the lateral thyrohyoid region. This is a procedure to be tried when the preceding measure fails. The operation is carried out on both sides. It is often contraindicated by the general condition of the patient.

5. The ultimate recourse, when *local* measures have lost their potency, is general *morphinization* of the patient. When freely used, it brings relief from the pain and induces euphoria—a boon in the patient's final hours.

SURGICAL PROCEDURES.

Surgery has attempted to offer its contribution to the treatment of tuberculosis by the application of the principles and methods of general surgery to the fibrocaseous process involving the lungs. The only procedure of interest so far is **artificial pneumothorax**, which has given results in the small proportion of cases in which there are definite indications for it.

The conclusions reached by Morelli regarding artificial pneumothorax in pulmonary tuberculosis are as follows:

Artificial pneumothorax should always be tried: 1. *In tuberculous cases presenting pleurisy in addition to fairly pronounced unilateral lesions.* 2. *In those with repeated hemoptysis.* 3. *In all cases in which the customary treatment fails to yield any improvement.*

The results claimed for the procedure are these:

The institution of artificial pneumothorax is frequently impossible on account of adhesions—in 25 to 70 per cent. of cases, according to various writers. As for the ratio of cures, Brauer and Saugmann give it as 33 per cent., Zink as 10 per cent., Meyer as 2:26 and Murphy as 4:50.

Morelli concludes that artificial pneumothorax is the treatment of choice for pulmonary tuberculosis; that it should not be used to the exclusion of other procedures (hygiene and various medical treatments), but that, such as it is, it is a "marvellous treatment which has no equal in phthisiotherapy."

F. Dumarest and C. Murard, of the Hauteville sanatorium, in their authoritative monograph, describe the indications, which may be condensed thus:

Pulmonary tuberculosis supplies nearly all of the patients in whom artificial pneumothorax is applicable. The general indications progressively increase from the fibroid forms to the caseous forms and from the sluggish forms to the active forms. It should be thought of neither in the mild, abortive forms of tuberculosis, nor in the very slow saprophytic forms, nor in the fibroid forms themselves. The

diffuse forms with a bronchial distribution, accompanied by extensive inflammatory epiphenomena, are only rarely suited for it.

On the other hand, artificial pneumothorax is indicated in the localized ulcerative, extending forms and the congestive caseous forms of young subjects, running a destructive course, frequently with hemoptysis. Next come the common fibrocaceous forms with marked unilateral predominance, in which the risks inherent in the procedure and those of the spontaneous progression of the disease must be weighed in each case.

Lastly, there are the acute forms of lung involvement, the pneumonic forms and the bronchopneumonic forms of lobar distribution, in which the patient has nothing to lose and in which, following pneumothorax, there is often witnessed a surprising arrest of the disease. One should not forget, however, that too often such arrest is only momentary and that the result of the procedure amounts to little more than a respite (Rénon). In the miliary forms, on the other hand, pneumothorax is incapable of yielding any success.

The stage of the tuberculous condition should not, under these circumstances, enter into the question. From the moment that the spontaneous course of the disease is causing the patient to run greater risks than those which attend the treatment itself, the latter should tilt the scales in its direction. The question of the stage of the disease enters into this appreciation all the less in that early intervention possesses many advantages, dependent notably on the fact that adhesions have not yet formed, that new localizations of the disease are prevented, and that the resisting power of the subjects is greater than it would be later on.

Another prerequisite to successful intervention is that the disease be unilateral, not from the pathologic standpoint, but from that of the course of the disturbance. As a matter of fact, on the one hand, pathologic unilaterality scarcely occurs, but on the other hand, pneumothorax applied for lesions running an active course on one side often acts favorably on the incipient lesions on the opposite side.

There are some special indications for pneumothorax different from those just referred to, and these special indications for it are frequently imperative. Among this group is *hemoptysis*, and especially, severe ulcerative hemoptysis which may cause death itself or through the infectious complications to which it leads. Pneumothorax is the only certain means, or heroic remedy, against this dreaded complication, and it checks hemoptysis as would the application of a ligature.

In the second place, *spontaneous pneumothorax in the tuberculous* should be maintained, as has long been known: When it is only partial

it should be made complete. *Tuberculous empyema* is another good indication.

"In the course of serofibrinous pleurisy without established pulmonary lesions," writes Dumarest, "the most prudent course appears to me to be to wait for the indication for puncture by reason of an excessive amount of effusion, and then to carry out, not a drying out process, but the partial evacuation required and replacement of the fluid by the amount of gas (oxygen) necessary to bring the intrapleural pressure back to zero, avoiding an excessive pressure which the puncture has precisely for its object to overcome."

Aside from tuberculosis, this same author deems **artificial pneumothorax indicated**:

1. In *abscess of the lung* and *suppurating hydatid cysts*.
2. In *bronchiectasis* and *pulmonary gangrene*.
3. In certain *penetrating wounds of the lung* with hemoptysis.

The **contraindications** are given as:

1. The *other localizations of tuberculosis*, *c.g.*, enteritis.
2. *Emphysema* and *diffuse fibroses*.
3. *Manifest cardiac insufficiency* with a marked tendency to partial heart-failure.
4. *Pronounced general debility* or a marked *dyscrasic disturbance* (diabetes, albuminuria).
5. *Extreme emotivity*; *excessive pusillanimity*.
6. "*Age and sex* have no bearing on the indications. *Pregnancy* is not a hindrance."

* * *

For the sake of completeness and their possible suggestive value, the following procedures may be recalled:

Sclerogenic injections of zinc chloride into the lung, as entailed in Lannelongue's method; these injections are done blindly, are dangerous, and were abandoned soon after their introduction.

Drainage of cavities through the chest wall, the altogether deplorable results of which soon led to its being thrown into the discard.

Pneumectomy, or resection of the diseased portion of the lung, is a traumatic procedure which causes the patient to run considerable risk, and can be applicable only to a lesion of extremely limited size. The risk is out of all proportion to the results to be expected of the procedure.

Resection of the first nine ribs in one or two stages, or *costoplastic pneumolysis*, has for its object to bring about collapse of the lung and approximation of the walls of the tuberculous cavities. The opera-

tive risk is large ($\frac{1}{3}$ of operative deaths). In the favorable cases (Lenormand and Loew), constituting about one-half of the whole number, there is observed a marked lessening of the expectoration, cough and fever, and improvement of the general condition. In one-tenth of the cases the operators felt themselves warranted in using the word "cure."

Freund's operation, or resection of the upper costal ring, is of problematic interest in tuberculosis.

OUTLINES OF TREATMENT FOR THE PRINCIPAL CLINICAL FORMS OF PULMONARY TUBERCULOSIS.

I.—AFEBRILE TUBERCULOSIS, *with anorexia, loss of weight, asthenia, permanent congestion of one apex, without hemoptysis, bronchitis or dyspepsia.*

I.—Hygienic Treatment.

(a) *Rest* in bed, twelve hours; on the couch, nine hours; walking on level ground, three hours (divided into three walks).

(b) *Window open* night and day; the day to be spent in the open air under a shelter or on a porch if the climate and season permit.

(c) *Regular, substantial feeding*, but without being pushed to excess. Stress to be laid mainly on broiled or roasted red meats without sauce; eggs, brains, lean ham; beans, lentils, chestnuts, potatoes, carrots, spinach, salads, figs, dates, apples, and Gruyère and Camembert cheeses; as beverage, beer, malt extract, red wine, or Saint-Galmier water.

(d) *Daily chest rubs* with:

℞ Spiritus lavandulæ (2 per cent. oil),	
Spiritus rosmarini,	
Alcoholis	5ā 80 c.c. (f3iiss);
Terebinthinæ laricis	12 c.c. (f3iij).

M. Sig.: For external use.

(c) *Weight* to be taken weekly and the temperature morning and evening.

II.—Systematic Treatment.

(a) For ten days in the month:

℞ Strychninæ sulphatis	0.03-0.05	gram	(gr. $\frac{1}{2}$ - $\frac{3}{4}$);
Sodii monomethylarsenatis (arrhenal) ..	1	gram	(gr. xv);
Sodii glycerophosphatis (N. F.)	10	grams	(3iiss);
Extracti cinchonæ	20	grams	(5v);
Spiritus vini vitis	40	c.c.	(f3x);
Glycerini	q. s. ad 150	c.c.	(f3v).

M. Sig.: One teaspoonful three times daily with the meals in a glass of beverage (coffee or coffee with milk, etc.).

At the end of the ten days the preparation should be discontinued for a week, then resumed.

(b) Sufficient salt to be used on the food (6 to 10 grams a day). One knifepoint of a lime salt (calcium phosphate or carbonate) should be dusted over the food, especially the soups and purées.

(c) One tablespoonful of *fresh meat juice* (corresponding to 100 grams of meat) to be taken at 10 a.m. and again, if required, at 4 p.m.

(d) Twice a month, a *small fly blister* alternately in the infra-clavicular, supra- and infraspinous regions.

II.—INCIPIENT TUBERCULOSIS *with slight but permanent impairment of the breathing at one apex.—Fatigue fever.—Asthenia, anorexia and loss of weight.*

I.—Hygienic Treatment.

(a) *Absolute rest in bed* until fever has completely subsided for at least three days. Rest on couch, then progressive regulated exercise, as in I.

(b) Gradual habituation to the *open window* day and night.

(c) Exclusive liquid diet until the fever has subsided, distributed in four meals, at 8 a.m., noon, 4 and 8 p.m.

Milk, tea, coffee, chocolate, tapioca, vermicelli, macaroni, rice with milk.

Lean or bouillon soups with pastes, egg yolks, meat jelly, chopped fowl.

Eggs; vegetable purées; fruit marmalades, compotes, dry cakes.

One to three tablespoonfuls of meat juice.

When fever has subsided, there should be added gradually:

Oysters, brains, lean ham, smoked tongue.

Dark or white meats, broiled or roasted; purée of dried vegetables; cheeses.

(d) *Weight* to be taken weekly and the temperature morning and evening.

II.—Systematic Treatment.

(a) \mathcal{R} Quininae dihydrochloridi 0.05 gram (gr. $\frac{3}{4}$);
 Calcii phosphatis 0.25 gram (gr. iv);
 Acidi tannici 0.1 gram (gr. iss).

Pone in caps. No. i. Da tal. No. xl.

Sig.: Four capsules a day during the period of fever, with the four meals.

When the fever has subsided:

(b) *Codliver oil*, if tolerated; three or four tablespoonfuls in two doses with aromatics or in an emulsion.

(c) Daily injections of *sodium cacodylate*, 0.05 to 0.1 gram ($\frac{3}{4}$ to $1\frac{1}{2}$ grains), in courses of six injections, followed by a week's intermission.

(d) *Adrenalin* solution, 1:1000, ten to thirty drops twice a day with meals, for ten or twelve days a month.

III.—**INCIPIENT TUBERCULOSIS** with permanent congestion of one apex, hemoptysis, intermittent febrile flare-ups, and loss of weight.

I.—*Hygienic Treatment*, as in II.

To be particularly avoided: Too hearty meals, excess of conversation, smoke, exertion, coitus and constipation.

II.—*Systematic Treatment*.

(a) Use of creosote, arsenicals (especially the cacodylates) and sulphur compounds to be interdicted, particularly during the periods of hemoptysis.

(b) *During hemoptysis*:

(1) Rest in bed; no visitors; no conversation.

(2) An exclusively liquid, light diet.

(3) If required:

Ipecac, 2 grams (30 grains), to be infused in 90 cubic centimeters (3 fluidounces) of water; to the resulting infusion is added enough syrup of opium (2 per cent. of the extract) to make 120 cubic centimeters (4 fluidounces). To be given in teaspoonful doses at half hour intervals.

Or: Inhalation of 3 to 5 drops of amyl nitrite at intervals.

Or:

℞ Quininae dihydrochloridi,
 Extracti ergotæ aquosi (N. F.)āā 0.05 gram (gr. $\frac{3}{4}$);
 Extracti opii 0.01 gram (gr. $\frac{1}{6}$).
 Ft. pil. No. i. Da tal. No. xii.
 Sig.: Four to eight pills in the 24 hours.

IV.—**TUBERCULOSIS IN THE STAGE OF SOFTENING**, with little or no fever and moderate expectoration.

I.—*Hygienic Treatment*, as in II.

II.—*Systematic Treatment*.

(a) At 10 a.m. and 4 p.m., one tablespoonful of fresh meat juice (corresponding to 100 grams of meat).

- (b) ℞ Sodii chloridi,
 Magnesii oxidi,
 Calcii phosphatisāā 0.2 gram (gr. iij);
 Calcii carbonatis 0.5 gram (gr. viiss).

Pone in chart. No. i. Da tal. No. xxx.

Sig.: One powder at each meal in some mineral water.

Alternating measures (to be continued for months):

The first ten days:

- (a) ℞ Codeinæ 0.01 gram (gr. $\frac{1}{60}$);
 Sodii arsenatis 0.002 gram (gr. $\frac{1}{50}$);
 Sodii benzoatis,
 Terpin hydratisāā 0.1 gram (gr. iss);
 Tolu q. s.

Ft. pil. No. i. Da tal. No. xl.

Sig.: Four pills a day.

The next ten days:

- (b) ℞ Quininæ dihydrochloridi,
 Pulveris ipecacuanhæ et opiiāā 0.05 gram (gr. $\frac{3}{4}$);
 Thiocol 0.5 gram (gr. viiss).

Pone in cachet. No. i. Da tal. No. xl.

Sig.: Four cachets a day.

The last ten days:

(c) Tartar emetic, granules of 0.001 ($\frac{1}{65}$ grain) each. Six to twelve granules in the twenty-four hours, unless nausea is present.

V.—TUBERCULOSIS IN THE STAGE OF SOFTENING,
with fever, congestive flare-ups and copious expectoration.

I.—Hygienic Treatment, as in II.

II.—Medicinal Treatment.

(a) Avoid creosote, cacodylates, sulphur compounds, long journeys and exciting climates.

(b) If the fever is persistent and high: Chest packs and cold sponging; then try in alternation:

- (1) ℞ Quininæ dihydrochloridi 0.2 gram (gr. iij);
 Antipyrinæ 0.5 gram (gr. viiss).

Pone in cachet. No. i. Da tal. No. xx.

Sig.: One cachet at 9 A.M. and at 2 P.M.

(2) Cryogenin capsules, each containing 0.2 gram (3 grains). One capsule at 9 a.m. and one at 2 p.m.

(c) *Alternate every ten days:*

- (1) ℞ Ammoniaci,
 Pulveris ipecacuanhæ et opiiāā 0.05 gram (gr. $\frac{3}{4}$);
 Sodii benzoatis,
 Terpin hydratisāā 0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xl.

Sig.: Four pills a day.

- (2) R Spiritus ammoniæ anisati (N. F.) 4 c.c. (f3j);
 Sodii benzoatis 4 grams (3j);
 Syrupi codeinæ (N. F. IV),
 Syrupi terebinthinæ (10 per cent.),
 Syrupi senegæ āā 45 c.c. (f3iss).

M. Sig.: Four tablespoonfuls in the 24 hours.

(3) Daily injections of 5 to 10 cubic centimeters (80 to 160 minims) of a 10 per cent. solution of gomenol in oil.

VI.—**FORMER TUBERCULOSIS**, *sluggish, afebrile, with limited lesions and free suppuration (bronchial catarrh type)*, a common form in the aged.

I.—*Hygienic Treatment.*

(a) Comparative rest.

(b) Systematic, continuous fresh air treatment.

In the winter, a dry, warm climate, if possible.

Confined, dust- or smoke-laden air to be avoided.

(c) A regular, substantial but moderate diet.

II.—*Medicinal Treatment.*

(a) *Inhalations of aromatics*: Eucalyptol, tincture of benzoin, thymol, etc.

Nasopharyngeal spraying of liquid petrolatum containing 2 per cent. of resorcinol.

Morning and evening, for ten minutes, spraying with:

- R Eucalyptolis 10 c.c. (f5iiss);
 Decocti cetrariæ (N. F. III) q. s.
 Aquæ destillatæ q. s. ad 1000 c.c. (f3xxxiv).
 Ft. emulsum.

The patient moves gradually closer to the jet of spray, and executes deep inspirations. (These inhalations may be repeated up to six times a day.)

(b) Alternate in periods of ten days the following three measures:

1. R Creosoti 10 c.c. (f5iiss);
 Decocti quillajæ 90 c.c. (f3iiij).
 Fac. sec. art.

Sig.: Mix gradually one to four teaspoonfuls in a wineglassful of milk, add five drops of laudanum, and use as an enema, to be retained and repeated daily.

2. R Pulveris ipecacuanhæ et opii,
 Sodii benzoatis,
 Ammoniaci,
 Terpini hydratis āā 0.1 gram (gr. iss).

Ft. pil. No. i. Da tal. No. xl.

Sig.: Four pills a day.

3. \mathcal{R} Sodii iodidi 10 grams (3iiss);
 Sodii bromidi 20 grams (5v);
 Sodii chloridi 40 grams (3x);
 Aquæ 300 c.c. (f5x).

M. Sig.: One tablespoonful in the morning and at 4 P.M. in a cup of milk.

III.—*External Treatment.*

Daily chest rubs with a dilute turpentine liniment.

VII.—TUBERCULOSIS IN THE STAGE OF CAVITATION, *with hectic fever, cachexia, abundant expectoration and impaired nutrition.*

I.—*Hygienic Treatment*, as in II.

Windows to be closed in the *morning* to avoid subnormal temperature.
 Free antiseptic vaporizations.

Small but frequent meals—every three hours. Beaten eggs, meat juice, black coffee, and alcoholic stimulants to be used.

II.—*Medicinal Treatment.*

(a) Treat the *symptoms*: Cough, sleeplessness, fever, asthenia, sweats, etc.

(b) Give alternately, *morning and evening*:

(1) An injection of 1 to 4 cubic centimeters (15 to 60 minims) of 10 per cent. camphor in oil.

(2) An injection of 1 to 3 cubic centimeters (15 to 45 minims) of:

- \mathcal{R} Strychninae sulphatis 0.01 gram (gr. $\frac{1}{4}$);
 Aquæ destillatæ 10 c.c. (f3iiss).—S.

VIII.—PULMONARY TUBERCULOSIS WITH ALBUMIN- URIA of *tuberculous origin*.

1. Rest, at first absolute, then relative; fatigue and exposure to cold to be avoided.

Life to be spent preferably in a warm, dry climate.

A regular and substantial diet, consisting particularly of milk, milk preparations, eggs, cheeses, vegetable purées, marmalades, compotes and dry cakes.

Add cautiously and sparingly meat, fowl and lean ham.

2. Few drugs: Phosphates, tannic acid, and arsenicals in small doses.

IX.—PULMONARY TUBERCULOSIS IN A DIABETIC.

I.—Hygienic Treatment.

(a) Intensive *rest and open air cures* as in II.

(b) Diet: Bouillon soups, red or white meats, fowl, fish, oysters, eggs, potatoes, green vegetables, various cheeses, oranges, apples, butter, fats and olives. No pastry, no sugar, no beer. Glycerin or saccharin in place of sugar.

II.—Medicinal Treatment.

(a) *In the winter, in the morning*, three to six tablespoonfuls of cod-liver oil.

(b) At 10 a.m. and 4 p.m., one tablespoonful of *fresh meat juice*.

(c) *Alternately in ten-day periods*:

- (1) ℞ Calcii glycerophosphatis,
Magnesii oxidi,
Sodii bicarbonatisāā 0.3 gram (gr. v).

Pone in cachet. No. i. Da tal. No. xxx.

Sig.: One cachet three times daily with meals.

- (2) ℞ Strychninæ sulphatis 0.03-0.05 gram (gr. $\frac{1}{4}$ - $\frac{3}{4}$);
Arrhenal 0.8 gram (gr. xij);
Sodii glycerophosphatis (N. F.) 10 grams (ʒiiss);
Extracti cinchonæ 20 grams (ʒv);
Spiritus vini vitis 40 c.c. (f5x);
Glycerini q. s. ad 150 c.c. (f5v).

M. Sig.: One teaspoonful in a little water three times daily with the meals.

(3) Thiocol in 0.6 gram (10 grain) cachets. Three to four cachets a day.

[(d) *Insulin* for the diabetic condition, according to requirements.]

X.—PULMONARY TUBERCULOSIS AND SYPHILIS.
(Syphilis in a tuberculous subject.)

I.—Hygienic Treatment.

That already described for chronic pulmonary tuberculosis.

II.—Medicinal Treatment.

(a) For twenty days a month, and for two months out of three, a daily hypodermic injection of 2 cubic centimeters (30 minims) of the following:

- ℞ Hydrargyri iodidi rubri,
Sodii iodidiāā 0.4 gram (gr. vj);
Sodii cacodylatis 1 gram (gr. xv);
Aquæ destillatæ 40 c.c. (f5x).—M.

(Each cubic centimeter contains 0.01 gram— $\frac{1}{10}$ grain—of the biniodide and 0.025 gram— $\frac{1}{20}$ grain—of the cacodylate.)

Or, if the above procedure is impracticable, daily rubs with 3 grams (45 grains) of mercurial ointment.

Or, the following pills:

℞ Sodii arsenatis 0.002 gram (gr. $\frac{1}{30}$);
 Hydrargyri iodidi rubri 0.005 gram (gr. $\frac{1}{12}$);
 Extracti cinchonæ,
 Calcii phosphatis āā 0.1 gram (gr. iss).
 Ft. pil. No. i. Da tal. No. lxxx.
 Sig.: Four pills daily.

Or, *neoarsphenamin* in intravenous injections or by enema, every five days, in ascending doses of 0.15 to 0.6 gram.

(b) For the remaining ten days in the month, the following tonic combination:

℞ Strychninæ sulphatis 0.03-0.05 gram (gr. $\frac{1}{4}$ - $\frac{3}{4}$);
 Sodii glycerophosphatis (N. F.) 10 grams (5iiss);
 Extracti cinchonæ 20 grams (3v);
 Spiritus vini vitis 40 c.c. (f5x);
 Glycerini q. s. ad 150 c.c. (f3v).
 M. Sig.: One teaspoonful three times daily.

XI.—ACUTE TUBERCULOSIS OF THE TYPHOID TYPE, WITH FEVER.

I.—Hygienic Treatment.

(a) *Absolute rest in bed.*

(b) *Continuous aëration.*

(c) A *substantial, but liquid diet*, taken in small meals: Milk, milk preparations, soups made with meat or chicken bouillon with tapioca, vermicelli, macaroni, meat jellies, peptones, somatose, vegetable purées, marmalades and fruit jellies, tea, coffee, biscuits, dry cakes.

If the digestive functions are sufficiently active, the tongue clear and moist, and the fever moderate, the following articles may be tried: Eggs, meat juice, chicken croquettes, filet of sole, brains, etc.

II.—Symptomatic Treatment.

(a) Combat the *fever* with *cold sponging*, *chest packs*, and possibly quinine.

(b) Combat the *infection* by collargol rubs or injections.

(c) Combat *pulmonary congestion* with chest packs, mustard poultices, cupping and digitalis.

(d) Combat the *adynamia* with coffee, alcohol and cinchona:

R Strychninæ sulphatis	0.3-0.5	gram	(gr. $\frac{1}{2}$ - $\frac{3}{4}$);
Sodii glycerophosphatis (N. F.)	10	grams	(3iiss);
Extracti cinchonæ	20	grams	(3v);
Spiritus vini vitis	60	c.c.	(f3ij);
Glycerini	75	c.c.	(f3iiss).

M. Sig.: Three or four teaspoonfuls a day in coffee or wine.

(e) Combat *dyspnea* with fresh air, cupping, inhalations of oxygen, ether and morphine.

R Syrupi ætheris (2 per cent.),	
Syrupi morphinæ (0.05 per cent.)	100 c.c. (f3iiss).

M. Sig.: One tablespoonful at a dose; at most, four tablespoonfuls in the 24 hours.

HOUSING THE TUBERCULOUS.

By G. Porx, M.D.

Those who for more than a quarter of a century have followed the developments in phthisiology have been aware how greatly the present conception of tuberculosis differs from that of the past, and how much the knowledge newly acquired and confirmed experimentally and clinically has modified the practical line of conduct of the physician towards the tuberculous patient. Whereas, formerly, he contented himself with affirming the existence of the disease—with more or less evidence in support,—to-day, making use of all the clinical and biological methods of investigation at his disposal, he is able to determine exactly the extent of the lesions present, their degree of activity and their course, and to formulate as complete a diagnosis as possible.

Furthermore, medical procedure, however important, is today no longer the only step he is required to take; he must supplement it by a social procedure the utility of which is no less great. It is the data furnished by an accurate diagnosis on the one hand, and on the other, the results of an inquiry into the patient's social status, that will enable him to make a choice of a domicile for the latter.

Consideration must, however, be given in the first place to the rather frequent instances where the tuberculous patient, on account of the circumstances under which he lives, is unable to follow the dietetic-hygienic treatment anywhere but at his customary dwelling-place, or in the country with his family. This plan should be advised only if the local climatic factors are not unfavorable, and if conditions as to hygiene, prophylaxis, and housing are adequate, *i.e.*, permit of following the rational treatment and of avoiding contamination of the other members of the family, and especially the children.

While under these conditions the consumptive may get well, since, as has been stated, tuberculosis can be recovered from in all latitudes, it is none the less true that the recovery will be more rapid and certain if the treatment is carried out in the special institutions located in favorable climates and provided with a particularly competent medical staff.

We shall now take up in a practical manner the question of housing of the child, and thereafter that concerning the adult.

I. Children.

The frequency of tuberculous contamination in childhood is well known; hence the medical and social importance of the proper placing of children.

From this standpoint we may class children into three categories: (1) Healthy children exposed to infection in their homes; (2) children with a mild, non-contagious form of inactive extra-pulmonary tuberculosis (generally living in contaminated surroundings), and (3) children with active extrapulmonary tuberculosis. Intentionally we omit those children suffering from pulmonary tuberculosis, the tuberculous infection in these cases often assuming an acute form which precludes any special placing.

A. Healthy children free of tuberculosis and exposed to home infection.

(1) Those between three and fourteen years of age should be placed with families, *viz.*, in the country, with the families of healthy farmers, where they will be brought up and educated until all danger of home contagion has passed.

In cases where, for reasons of a social order, placing of the children with families is not feasible, the healthy but exposed child may be sent to an establishment for collective housing. The expense entailed in these establishments is, however, much greater than that involved in individual placing of the patient.

(2) As for young children, from birth to three years of age, the home placing of nurslings is sometimes effected in "bringing-up centers," *i.e.*, in a village or group of villages in which the nurslings, previously examined, are placed with wet-nurses, to be nurtured by them under the supervision of a physician and a visiting nurse.

B. Children with a mild form of extrapulmonary tuberculosis (inactive glandular disease, sequelæ of pleurisy or tuberculous arthritis), but non-contagious and generally living in contaminated surroundings.

These cases are suitable for treatment in a "preventorium," where they recover from their initial lesions and are, in addition, removed from repeated home infections.

A preventorium, according to the definition adopted by the First International Congress on Open-air Schools, as proposed by Léon Bernard, is an institution situated in the country, where children, generally exposed to family contagion, afebrile and non-contagious, suffering from initial, latent and curable forms of non-pulmonary tuberculosis, undergo, as resident patients, special hygienic treatment comprising a supervised diet, constant exposure to fresh air, and a combination of rest and physical training adjusted, respectively, through the collaboration of a physician and a pedagogue.

C. Children with active, non-pulmonary tuberculosis of the bones, joints, lymph-nodes, skin or peritoneum.

These patients are suitable for the sea-coast institutions.

II. Adults.

A. Patients with pulmonary tuberculosis that is curable or greatly to be improved by treatment, without any existing acute lesion.

If these patients have means they should be sent to a private sanatorium; if of limited financial resources, they may be treated in a public sanatorium, and upon leaving it may remain for a time in a health school for vocational training.

Private sanatoriums may be divided into groups according to the altitude at which they are situated.

Public sanatoriums are either charitably supported, or appertain to various societies, or to Red Cross societies, or may belong to various governmental divisions, which accounts for the varying conditions of admission to these establishments.

Sanatoriums for vocational training are schools intended to receive patients on leaving the sanatorium and to give them training, mostly practical, in agriculture in general, and more particularly in gardening. Most of these establishments are reserved for war veterans.

B. Patients with pulmonary tuberculosis not falling in the preceding category.

In practice, these patients may be classed as follows: Those who need to be kept under observation for a time on account of the difficulty of making a diagnosis, before a sound decision can be made in their case; those who have an acute flare-up requiring their hospitalization, and lastly, those consumptives who have reached the final stage of the disease. All these may be dealt with in either hospital-

sanatoriums or isolation hospitals, according to existing local conditions. The former are establishments situated near large cities, in the midst of large and cultivated spaces, in buildings generally of rather old construction, but arranged in such a manner that patients may undergo proper sanatorium treatment. This is an excellent method, which should be encouraged, for the yield from these establishments as regards social prophylaxis is, at equal cost, much greater than that from the ordinary sanatoriums.

DISEASES OF THE KIDNEYS AND URINARY PASSAGES.

(Written with the collaboration of DR. SAINT-CÈNE.)

I.—RENAL INSUFFICIENCY. NEPHRITIS.

From the medical standpoint, the treatment of disorders of the kidneys is dominated by the condition of renal insufficiency, or *uremia*, which modern analytic investigations have dissociated into a number of fundamental components (chloridemia, azotemia, hydremia), which may be met with clinically in varying degrees of separation or combination, and the occurrence of which yields distinct and precise therapeutic indications. These are at present the outstanding features in the treatment of *nephritis*.

Next in the order of frequency and clinical importance is *nephrolithiasis*. This subject will be taken up in the second section.

Suppurative disorders of the kidneys will be discussed in a third section.

The major *specific diseases of the kidneys*—*tuberculosis*, *syphilis* and *cancer*—will be taken up in a fourth section.

Hyperemic states of the kidneys will be recalled briefly.

Brief mention will also be made of a few points relating to *amyloid degeneration of the kidneys* and to *renal hyperpermeability*.

The last section will contain a short summary of the therapeutic facts to be borne in mind in connection with *floating kidney* and *hydronephrosis*.

Many of the common urologic symptoms—albuminuria, oliguria, polyuria, hematuria, renal colic, high blood-pressure, etc.—have already been discussed in separate sections in Part III (*q.v.*).

At many points in the text Castaigne's work, entitled "*Maladie des reins*," with its clear presentations and rational synthetic conclusions, has afforded guidance.

ACUTE NEPHRITIS.—The treatment of *ordinary acute nephritis*, such as that accompanying or following infections, can be summarized in a few lines:

1. Treatment of the *causal infection* by appropriate measures, specific or non-specific (see *Infectious Diseases*).

2. Rest in bed or on an armchair or couch.

3. An exclusive milk diet, 3 liters a day, or better, a mitigated milk diet, consisting of 1 to 2 liters of milk, with carbohydrates

(sugar, tapioca, mush, pastes, fruit jellies, dry cakes, etc.), in four meals at regular intervals: 8 a.m., noon, 4 and 8 p.m.

4. Decongestive, derivative measures: Mustard applications, wet cupping.

5. Careful protection against exposure to cold: Flannel waistband, warm wrappings and suitable heating of the room.

Under these "natural" influences alone, 95 per cent. of the cases of ordinary acute nephritis go on to an almost complete recovery with the renal tissues almost wholly restored; the remainder pass into chronic renal disease.

A few adjunct forms of medication may be useful; the treatment appropriate according as the nephritis is mainly of the hydremic (high pressure), chloridemic (causing dropsy) or azotemic (leading to uremia) type will be described later on.

The *iodotannic preparations* and *calcium chloride* are frequently useful during the later stages of acute nephritis. As for the diets that must follow the initial period of exclusive milk diet, these will be found described further on under chronic nephritis.

HYPERACUTE NEPHRITIS, usually of toxic origin and following the absorption of more or less massive doses of kidney poisons (corrosive sublimate, phosphorus, cantharides, etc.), with the schematic clinical picture alluded to by Castaigne: "Anuria, coma and death, all occurring in the absence of edema and of signs of major uremia."

The relatively small number of recoveries on record precludes reference to any very definite therapeutic indications. Following are some of the heroic measures that may be employed in such cases:

1. Venesection or vein puncture.
2. Intravenous injections of glucose solution.
3. Surgical intervention: Decapsulation of the kidney or nephrotomy with drainage of the renal pelvis to be attempted.

CHRONIC NEPHRITIS.—**Treatment of the Renal and Cardio-renal Syndromes.***—**Hydremic, hypertensive nephritis** is generally the same, especially at first, as the hypersphyxemic syndrome, the course and treatment of which have already been described (see *Diseases of the Circulatory System* and in Part III: *High Blood-pressure*).

During the periods of chronicity, following are the main features of the treatment:

* For the details of certain diets see in Part I: *Dietetics*, and for the details of administration and drug dosage, see Part I, sections on *Digitalis*, *Camphor in Oil*, *Diuretics*, etc.

1. Restriction of the total intake of food; *restriction of fluids*, so as to bring the daily output of urine to a maximum of $1\frac{1}{4}$ liters (at any rate, estimate as a maximal fluid allowance, $1\frac{1}{2}$ liters); withdrawal of alcohol and of tobacco; interspersed milk cures (1 to $2\frac{1}{2}$ liters) or fruit cures (grapes, 0.5 to 2 kilograms—1.1 to 4.4 pounds), once or twice weekly.

2. *Moderate, systematic bodily exercise*, baths and tepid hydrotherapy, general rubs.

3. *Certain diuretic drugs*: Sodium or lithium benzoate, theobromine compounds, and digitalin (French) in very small doses, 0.00005 to 0.0002 gram ($\frac{1}{300}$ to $\frac{1}{325}$ grain $\equiv \frac{1}{4}$ to 3 grains of digitalis leaves), in ten-day periods separated by intervals of ten days to prevent habituation.

4. *Systematic intestinal derivation* by means of aloes, jalap, scammony, etc., or even, one to three times a month, purgation with 40 to 50 grams ($1\frac{1}{3}$ to $1\frac{2}{3}$ ounces) of sodium sulphate combined with restriction to water or a fruit diet.

5. *Specific treatment*, if syphilis is present.

During the acute episodes (acute edema of the lungs, angina, epistaxis, hemorrhage), the treatment should be symptomatic, aiming to overcome the existing symptom (see *Angina Pectoris*, *Acute Edema of the Lungs*, *Cardiac Insufficiency*, etc.). The following basic features are applicable to all cases:

1. Absolute rest in bed or in an armchair.

2. Restriction to water, infusions, fruits, syrups and fruit juices, or a reduced milk diet (1 liter). Grape cure: 0.5 to 1 kilogram (1.1 to 2.2 pounds).

3. More or less extensive withdrawal of blood by wet cupping, leeching, vein punctures or venesection.

4. Lumbar puncture is capable of rendering service in cases of brain disturbance with hypertension of the cerebrospinal fluid.

The most effective treatment, in my opinion, comprises:

Venesection in the acute states.

Restriction of the total amount of food, and especially of fluids, in the periods of chronicity.

Heart-tonic medication: Digitalis, camphor in oil, and hypodermic injections of oxygen gas in the stage of cardiac decompensation.

As for iodide medication, which is almost customary in these cases, its risks are certainly far greater than its advantages. It may, nevertheless, be of service in the initial stage, when plethora is still dominant; when hydremia is very slight, transitory and intermittent, and when high blood-pressure and the evidences of water retention

(opsiuria) are moderate; under these circumstances sodium iodide or caffeine iodide, properly given, may be very useful. Later, and especially when there is a considerable degree of high blood-pressure, iodide medication is dangerous and brings on hemorrhage, as are likewise the mineral water cures.

Nephritis with chloride retention, promoting edema, is amenable chiefly to:

1. The *chloride-free diet*, with reduction of the fluid intake. This chloride-free diet, however, should not be too stringent nor continued too long a time; unduly strict régimes lead to cachexia. It is advisable to test the tolerance of the patient to salt, and from time to time, to institute temporary salt-free diets or well adjusted salt-low diets. The disadvantage of a prolonged salt-free diet is the production of anorexia, of achlorhydria, apepsia and impaired nutrition.

Chloride retention is never absolute. The amount of chlorides that may be allowed daily can be determined by trial.

The foods that may be utilized in the chloride-free diet are: Saltless bread, meat, fresh water fish, eggs, unsalted butter, fresh cream, potatoes, rice, vegetables of all kinds, raw or cooked fruits, sugar, sweets, preserves and pastry made with unsalted dough.

The standard dietary formulated by Widal and Javal may be recalled in this connection. It represents about 1500 calories, 1 gram of chlorides and 60 grams of protein:

Saltless bread	200 grams.
Meat (weighed raw)	200 grams.
Potatoes	250 grams.
Butter	50 grams.
Sugar	40 grams.
Wine	300 c.c.
Coffee	300 c.c.

It should not be overlooked that *milk*, which contains about 1.6 grams of salt to the liter, is nonetheless a satisfactory component of a diet low in chlorides; a stringent milk diet is, however, seldom to be recommended:

1. Because it requires 3 liters of milk—an excessive amount of fluid for a body overloaded with edema.

2. Because it does contain about 5 grams of salt, whereas many other dietary combinations afford a less amount.

3. Because, being monotonous, it soon becomes distasteful to the patients.

On the other hand, a diet of *milk, vegetables and fruit*, with 1 to 1½ liters of milk, rice, macaroni, etc., purées (unsalted), tapioca, mush, fruits and jellies, makes up a combination often to be recommended.

Whatever diet be decided upon, *salt is to be excluded as a culinary condiment*. One may substitute for it the moderate use of vinegar, lemon juice, tarragon, thyme, laurel, parsley, tomato, onions and even, in moderation, nutmeg and cloves.

The *allowance of fluid* should not exceed $1\frac{1}{4}$ to $1\frac{1}{2}$ liters, lest fatigue be imposed on the heart and diuresis interfered with.

2. *Diuretics* of the type of theobromine and calcium chloride, in alternating courses of ten days each to prevent habituation.

3. *Purgatives* of varying activity, such as rhubarb, senna, podophyllum, aloes, jalap and scammony.

4. *Heart-tonics* in the event of cardiac weakness.

5. *General tonics*, such as cinchona, strychnine, glycerophosphates, etc., if there is a tendency to cachexia.

6. *Local measures to overcome edema*, where this symptom seems difficult to relieve: Aseptic punctures, drainage, etc.

7. As in all other forms of nephritis, *specific treatment* if there is syphilitic infection.

Nephritis with nitrogen retention, leading to uremia, comprises the cases most refractory to treatment; these cases may, however, be much improved:

1. By the systematic use of a *low-nitrogen diet* (see Part I: *Dietetics*), with regular interspersing of one or two days a week of restriction to water or a reduced milk diet. It should not be overlooked, however, as Castaigne may be given the great credit of insistently pointing out, that unduly reduced diets lead to cachexia more quickly than the disease itself. In these patients a compromise must be effected, the diet planned with the guidance of the body-weight, uranalysis, blood examination, and repeated, systematic clinical examinations, and the attempt made to obtain an optimal diet both without exceeding the excretory capacity of the kidneys and without accelerating the progressive impairment of nutrition which inevitably attends the disease itself.

The low-nitrogen diet is more difficult to carry out than the low-chloride diet, and the results are much slowly obtained and less satisfactory.

The food elements to be selected from consist mainly of the vegetables (except the legumins), fruits, fruit cures (grape cure, 0.5 to 1.5 kilograms—1.1 to 3.3 pounds), sugar and fats, not forgetting, however, that the body requires a certain amount of proteins, and that there may be advantage in employing certain foods of animal origin in this connection.

The following standard allowance formulated by Achard and Paiseau may be recalled:

Meat	50 grams.
Potatoes	200 grams.
Rice	100 grams.
Butter	50 grams.

This represents 1030 calories and 15 to 20 grams of protein. To my mind, it is utterly insufficient, and may and should be increased by the rather liberal addition of sweet desserts, fruits and other sugar-containing articles.

Salt should be allowed or interdicted according as chloride retention is absent or present.

As always, one should proceed on the basis of actual tests and experience in the individual case.

2. By care of the *skin*, this emunctory organ acting vicariously for the kidneys: Hot baths, dry rubs with the hair glove or rubs with a small amount of alcohol.

3. *Revulsive measures over the lumbar regions* and systematic *withdrawal of blood*, as by weekly dry or even wet cupping.

4. Regular *intestinal derivation*, more particularly by the use of the drastics in the form of cathartic pills (aloes, scammony, jalap, etc.) to be given two, three or more times a week.

5. In these cases *Guelpa's treatment* sometimes does wonders.

There is no doubt that in some cases, even far advanced, in which toxemia is profound and in which torpor has already nearly assumed the nature of coma, *absolute restriction to fluids*, combined with *active saline purgation*, may effect practically a resurrection of the patient. It is prudent and rational, however, to combine with these measures *general stimulant medication* in the form of injections of camphor in oil and *tonic and detoxicant medication* in the form of hypodermic injections of $\frac{1}{2}$ to 2 liters or more of oxygen. These oxygen injections give excellent results alike in the acute and the chronic cases.

6. Certain diuretics, such as *squill*, appear to have a selective action in promoting nitrogen elimination. Squill should be prescribed intermittently, with or without addition of the theobromine diuretics, in the dosage of 0.1 to 0.3 gram ($1\frac{1}{2}$ to 5 grains) a day.

7. Finally, I have at times witnessed marked alleviation of serious symptoms following the induction of *exutoria*, either by *repeated small blisters*, a *camphor blister* kept open and later oozing, or even by an *artificial dermatitis* brought on by rubbing with turpentine, or the reawakening of a latent *eczema*.

In the advanced, complicated forms in which the associated types of renal insufficiency are combined with cardiac insufficiency, the indications include simultaneously those relating to the various types of renal deficiency and those relating to heart weakness.

During the PERIODS OF ACUTE DISTURBANCE:

1. *Withdrawal of blood*, either in the form of a free *venesection* of 400 to 800 cubic centimeters (13½ to 27 ounces) in the acute cases with a tendency to acute dilatation of the heart and to pulmonary edema, or in *more moderate withdrawals* (wet cupping over the liver and in the lumbar regions; vein punctures) of 150 to 300 cubic centimeters (5 to 10 ounces) in the subacute or the cachectic cases.

2. *Restriction to fluids* or a *reduced milk diet* (Karell treatment): 800 to 1000 cubic centimeters of fluid (milk or water with lactose) taken in four divided amounts at regular intervals on the first two or three days, followed by a reduced diet, then a *moderate mixed diet*.

3. A *combination of heart-tonics, diuretics and drastic purgatives*.

Digitalis in high, heart- tonic dosage to be given during the periods of acute disturbance, and in intermediate or low dosage as a vasodilator during the intervals.

Regular use of the *drastics* (scammony, jalap, aloes, calomel).

The alternate employment of the diuretics of the type of *squill* and of *theobromine* supplies the main pharmacodynamic agencies for combined heart weakness and uremia, and the valuable combination of squill with scammony and digitalis meets these various indications extremely well.

4. *Hypodermic injections of oxygen gas*, which produce simultaneously heart- tonic, anti-asphyxial and antitoxemic effects, answer the most general indications that can be formulated in cases of this nature.

During the PERIODS OF CHRONICITY, there should be ordered:

1. A *moderate diet* low in nitrogen, chlorides and water, with interspersed days of restriction to fluids or to a fruit diet (grape cure) or a milk diet.

2. Regular *stimulation of the skin functions* by rubs with the hair-glove or general rubs with an aromatic and alcoholic mixture such as:

℞ Spiritus lavandulæ (2 per cent. oil),
 Spiritus rosmarini,
 Alcoholisāā 100 c.c. (f̄ss);
 Terebinthinæ laricis 15 c.c. (f̄ss).

M. Sig.: For external use.

3. Systematic *stimulation of the functions of the liver and bowel* by the regular ingestion weekly or twice weekly of the laxatives, saline purgatives and drastics.

4. *Continuous or subcontinuous stimulation of the heart and nervous system* by the intermittent and alternate use of digitalin, of strychnine, of sparteine, of camphor in oil, of oxygen injections, etc.

It is particularly under these conditions that the long-continued use of a digitalis preparation in small doses acting as vasodilators to the kidneys may be of service. The French crystallized digitalin should be prescribed in the dosage of 0.0001 to 0.00005 gram ($\frac{1}{650}$ to $\frac{1}{1300}$ grain), digalen in doses of 5 to 10 drops, or the powdered digitalis leaves in doses of 0.03 to 0.05 gram ($\frac{1}{2}$ to $\frac{3}{4}$ grain) with or without the addition of squill.

5. The alternate use of certain diuretics, such as *thecobromine sodio-salicylate* and *squill*.

As for the drawing up of diet schedules, it may be recalled, finally, that in all cases in which the disorder assumes a chronic form, the general nutrition factor should take the lead over that of renal weakness, and the dietary allowance, of whatever type it may be, should be so drawn up as to supply to the patient the number of calories and the amount of proteins and of mineral salts necessary for his nutritive balance and normal activity.

The clinical indications for *organotherapy* and for *surgical intervention* will again be borrowed substantially from Castaigne.

Organotherapy in Nephritis.

A. Renal organotherapy is carried out in four different ways:

Injectable kidney extract.

Extract of dried kidney.

Pulp or maceration of fresh kidney.

Serum from the renal vein.

1. **Injectable kidney extract.**—"In renal insufficiency, when gastric intolerance forms an obstacle to organotherapeutic treatment by the mouth, when serum from the renal vein is not available, or when anaphylactic manifestations are feared, recourse may be had to an injectable glycerin extract of the kidney, a measure which sometimes yields some improvement and which may enable the patient to get through a critical period. In the other cases, I deem it preferable to resort to the following organotherapeutic procedures" (Castaigne).

In this connection one may inject 1 to 4 cubic centimeters (15 to 60 minims) of a glycerin kidney extract or nephrin containing one-fourth of its weight of renal substance.

2. **Powdered dry extract of kidney tissue.**—In favorable cases this acts on the output of urine, the edema, chloride elimination and the albuminuria. Its action is, however, quite inconstant. It may be pre-

scribed in cachets of 0.25 gram (4 grains) each to the number of four to twenty a day.

3. Fresh kidney pulp or maceration.—In this connection, Castaigne's advice is as follows: "The maceration of kidney, which should be prepared under rather special conditions and must be absolutely fresh, is not applicable everywhere, at all times, nor by all physicians. Even under the most favorable circumstances it may lead to severe toxic effects, and before using it it is necessary to rid it of its toxic components and make sure beforehand that the kidneys used are not the seat of tuberculous changes, in order to obviate any possible—though rare—complications or untoward symptoms."

In short, Castaigne prefers the dry extracts, which afford most of the properties of the maceration without entailing the attendant risks.

Following is the procedure of Renault, the main sponsor of this method:

Take one or two kidneys of a young pig, strip off the capsules, chop up the kidneys, wash them, and grind them up into a pulp in a mortar with 450 cubic centimeters of 0.7 per cent. salt solution; allow to macerate for four hours in a cool place or in the ice-box, then decant, and administer the residue in four doses in the twenty-four hours in some cold or warm liquid. The fluid portion may be administered by enema.

Contrasting with unreservedly favorable expressions recognizing no restrictions nor contraindications, especially those of Renault, there are definitely unfavorable expressions, including those of Castaigne, who has witnessed many more or less serious untoward results, and even "three cases in which fatal uremic manifestations appeared following the use of the maceration of pig's kidneys and seem to have been brought on by this treatment."

Obviously, marked caution is necessary, to say the least.

4. Serum from the renal vein.—This method, introduced by Teissier, of Lyons, is based on the recognition of the kidney as an internally secreting gland. Castaigne writes as follows in this connection:

(a) *Favorable results:*

"I have seen headache, dyspnea, circulatory disturbances and, in particular, high blood-pressure and edema become less and often disappear very rapidly under its influence. But it is certainly its influence on the urinary secretion which presents the greatest interest; this is characterized essentially by the setting up of an extremely copious diuresis which may attain 6, 8 and even 10 liters in twenty-four hours.

An important feature is that this appears very rapidly and is generally accompanied by a discharge of chlorides.

"The serum from the renal vein, then, frequently produces remarkable effects; it does not produce them always, but no treatment can be expected to be always effective. Indeed, there is one factor which intervenes in all the cases, *vis.*, the intensity of the renal disease. The patient's response to the serum is proportionate to the condition of the kidney, being *nil*, in spite of large doses, in the cases with profound lesions of the organ, and striking, on the other hand, from a small dose, when the kidney is only superficially diseased, or at least, when it is still capable of responding sufficiently."

(b) *Possible untoward results:*

"Along with these favorable results, it is but fair to point out likewise the drawbacks of this treatment. In the first place, like the kidney extracts, it is capable of bringing on or increasing hematuria in certain subjects suffering from acute nephritis with a hemorrhagic tendency; it appears to me that this clinical variety constitutes a contraindication to the use of this serum or at least demands careful supervision of the patient who is undergoing this treatment.

"Again, this serum is subject to the drawbacks of any form of serum therapy, *i.e.*, serum disease. Following the injections of serum from the renal vein (six or seven days after the injection) there may sometimes be witnessed the appearance of untoward manifestations characterized by urticarial, morbilliform or scarlatinoid eruptions; these results are especially to be apprehended if an interval exceeding ten days elapses between successive injections."

The serum is prescribed in doses of 10 to 20 cubic centimeters given hypodermically for two to four days in succession; the measure should be discontinued promptly if it fails.

B. Extrarenal Forms of Organotherapy.—The forms of organotherapy most used in this connection are the hepatic, thyroid, suprarenal and pituitary.

Hepatic organotherapy is indicated "in the cases in which participation of the liver in the morbid phenomena witnessed can be shown." Such participation is frequent, and it is accordingly often rational to combine renal and hepatic organotherapy.

Thyroid organotherapy is useful mainly in the cases in which the renal disturbance is associated with thyroid insufficiency and myxedema. Aside from these cases, its use is altogether hypothetical and empirical, as the antitoxic and hypotensor actions mentioned in its favor have not been proved.

Suprarenal and pituitary medications should, it seems, be reserved for the small number of renal cases in which there is present, "in addition to the renal disease, a low blood-pressure, and in which not only the antitoxic and diuretic properties of these agents, but also their heart-tonic and blood-pressure-raising properties are to be called into requisition" (Castaigne). Their indications include the renal disturbances of hypophyseal cases, amyloid degeneration of the kidneys and conditions with renal hyperpermeability.

From this brief review, it appears that organotherapy, renal and extrarenal, may constitute sometimes a very useful adjunct to the general treatment of nephritis and renal insufficiency, but that it is far from being on a par with dietetic treatment or even with certain pharmaceutical agents, such as the diuretics, or physical agents, such as wet cupping.

As a *symptomatic* remedial agency, its indications are sometimes very definite (hepatic albuminuria, thyroid renal disturbance, degenerative processes with low blood-pressure, etc.).

As a *specific* remedial agency, calculated to make good renal insufficiency or stimulate the kidneys to activity, its value is still rather indefinite and its indications rather uncertain. In other words, it remains an empiric form of treatment.

Surgical Measures in Nephritis.—Three surgical procedures are feasible:

1. **Nephrectomy.**—This is indicated only very exceptionally, and must be reserved, it would seem, for certain cases of grave hematuria refractory to all other measures.

2. **Decapsulation.**—"This has for its purpose, first, to free the kidneys from their external adhesions, and then to expose the renal cortex by removal of its true capsule. The favorable effects of this renal decortication may be ascribed to the outpouring of blood it causes, the decompression and decongestion of the kidneys it brings about and the partial disconnection from nerves to which it leads. Its effects are only temporary, as a new enveloping layer heavier and thicker than the original one is reproduced very quickly" (Castaigne).

3. **Nephrotomy.**—This should, according to Pousson, be done in a thorough manner, the kidney being split along its convex margin from one pole to the other and down to the pelvis, and the procedure completed by prolonged drainage of the renal pelvis permitting of discharge of the pathologic secretions from, and washing out of, the pelvis.

The indications for these operations occur only very exceptionally.

PATHOGENESIS AND GENERAL TREATMENT OF AZOTEMIA.

1. **Excessive overproduction of urea in the system.***Chloroform poisoning.**Acute infections.**Excessive ingestion of nitrogenous foods.*II. **Relative oliguria.**

(The urine output is insufficient for the urea excretion, because of the low volume of urine and low maximal concentration of urea), temporarily.

*Acute or chronic heart disorders, especially when loss of compensation exists.*III. **Acute or chronic nephritis.**

(More or less pronounced oliguria + more or less reduced maximal concentration of urea), permanently.

1. *Restriction to fluids or a fruit diet, temporary.**Low nitrogen diet, continuous.*2. *Heart-tonics: Digitalis. Strophanthus.**Diuretics: Theobromine and its derivatives. Squill.*3. *Hypertonic glucose solution intravenously—500 c.c. to 1 liter—(slowly: ¼ to 2 hours).**Isotonic glucose solution subcutaneously and by rectum—½ to 1 liter—(by Murphy's method.)*4. *Blood withdrawals, depletant and detoxicant, wet cupping over the lumbar regions, vein punctures, or venesection (according to the case).*5. *Decapsulation in the course of acute nephritis with marked, progressive oliguria and low, descending specific gravity.*

Since in *acute nephritis* rapid recovery generally occurs under simple dietetic treatment combined with a few adjunct measures (wet cupping, etc.), nephrotomy can be recommended only in *hyperacute nephritis with anuria*, and in such cases should be done early; after twenty-four hours have elapsed, the prognosis is rather unfavorable.

Chronic nephritis represents, in general, a *noli me tangere*; there is risk of disturbing a more or less well established condition of compensation. According to Castaigne, the indications for nephrotomy are these:

1. *Pain* so distressing, obstinate and refractory to treatment that it precludes all active life.

2. *Hematuria*, when copious, rebellious and dangerous by reason of its obstinacy. Cystoscopy should then be carried out and, if necessary, ureteral catheterization; then nephrotomy and, if need be, nephrectomy may be attempted.

3. *Uremic complications* that are alarming and refractory to medical measures (diet, purgation, venesection, diuretics, etc.). Renal decapsulation is very uncertain in its results, which, in any event, are not lasting. Recovery from chronic nephritis under renal decapsulation is by no means proven. The greatest caution is in order in this connection.

II.—NEPHROLITHIASIS.

The presence of gravel or stones, of whatever nature, in the kidneys is clinically manifested in common symptoms:

1. Acute attacks: **Renal colic**, with the symptom-group denoting stone (pains in the lumbar regions, with exacerbations, and intermittent elimination of urine yielding uratic, oxalic or phosphatic deposits).

2. The customary evidences of **calculous pyelonephritis**, foremost among which are lumbar pain, intermittent hematuria, and pyuria.

3. Possible **complications**, especially *anuria* and *hydronephrosis*.

1. *These conditions*—renal colic, pyelonephritis, lumbar pains, hematuria, pyuria, anuria and hydronephrosis—*require symptomatic treatment, without too much attention being paid to their exact nature.*

- II. *Obviously, however, apart from these symptomatic treatments, which will be found discussed below, the causal, etiologic and actually curative treatment must also be instituted, on the basis of the variety of the lithiasis (uratic, phosphatic or oxalic) found upon chemical analysis.*

SYMPTOMATIC TREATMENT OF NEPHROLITHIASIS.

- I. **RENAL COLIC.**—By this term we mean here in particular the renal colic due to the migration of a stone, although in reality the term may be applied to any of the many painful manifestations supervening in the course of a renal disorder. Thus, the passage of an hydatid cyst or the expulsion of a clot produce the same effect as a stone, or practically so. Similarly, ureteral block in a case of movable kidney, with a sudden retention of urine in the kidney, may induce attacks of pain which, aside from the clinical course, can hardly be distinguished from renal colic of calculous origin. Some of the therapeutic indications relating to renal colic due to stone cannot prove suitable, however, in an attack of ureteral block due to movable kidney or in acute hydronephrosis (intermittent hydronephrosis). There is, therefore, advantage in ascertaining as soon as possible the actual cause of an attack of pain of renal origin.

The Immediate Treatment.—The most pressing indications may be summarized thus: *To allay the pain, combat the spasm and improve the general condition.*

Morphine hypodermically is the real anodyne measure—the most certain and the most effective. Not only does it *allay the pain*, but its *anti-spasmodic* action assists in overcoming the attack. The morphine should be given prudently, alone or in combination with atropine, generally

in the initial dosage of 0.005 to 0.01 gram ($\frac{1}{12}$ to $\frac{1}{8}$ grain), according to the patient, in a single or repeated dose, depending on requirements. Morphine may, if desired, be replaced by pantopon or similar preparations, or scopolamine combined with it.

Marion is of the opinion that the *main drug of value in renal colic is not morphine but belladonna*. Morphine stops the pain, but at the same time immobilizes the ureter, and the stone becomes fixed in the ureter without passing down. On the other hand, belladonna, in doses up to 0.08 Gm. ($1\frac{1}{3}$ grains) of the extract daily, in pills, sufficiently mitigates the pain and facilitates the progress of the stone by overcoming the ureteral spasm without stopping the peristaltic contractions.

In attacks of intermediate severity, a warm bath and hot fomentations over the lumbar region (poultices, compresses, etc.) give good results. If the attack continues, the morphine may be replaced by sedative suppositories or enemas of laudanum and antipyrin, and by chloral hydrate.

The **general condition** should be watched. A tendency to *faintness* and *circulatory depression* calls for injections of camphor in oil and sparteine. Care should be taken to warm the patient well.

For *vomiting*, an effervescent mixture of sodium bicarbonate and citric acid may be given, and cracked ice ingested (see Part III: *Vomiting*).

Treatment in a Prolonged Attack.—When the attack continues, it is necessary to facilitate the expulsion of the stone as much as possible. In this the diagnosis of the cause of the painful attack assumes some importance. If there is actual reason to believe that a calculus is coming down, its expulsion should be facilitated insofar as is feasible by hot baths and by the ingestion of infusions or diuretic waters; even sometimes by allowing the patient to remain up and about, without resorting, however, as some would advise, to violent movements. (Obviously these adjunct measures would not be indicated in an attack of pain due to movable kidney or acute renal retention.)

When, by its duration, the attack threatens to become alarming, it may in a number of instances be brought to a close by *ureteral catheterisation*, the ureteral catheter either succeeding in causing the stone to slip down into the bladder or permitting of the injection into the ureter or even the renal pelvis of a few drops of glycerin which will facilitate expulsion of the stone or stones.

Aside from the major acute or even hyperacute attacks of renal colic, there occur also less intense, very mild, merely incipient forms of renal colic, which are due to the passage of sand or gravel, generally phosphatic in composition, but the special feature of which is *repetition* of the attacks.

Here the treatment should consist especially in facilitating the expulsion of the gravel by the injection of fluids and hot baths. A

suitable mineral water cure may also be availed of. A precise and complete diagnostic study of the condition is required.

X-ray study of the kidney and ureter is always indicated after a severe attack of renal colic; it is especially necessary when the attack is prolonged or when, after an acute period, a dull pain in the lumbar region persists.

11. DISTURBANCES DUE TO MECHANICAL OBSTRUCTION BY THE CALCULUS.—(a) **Calculous Anuria.**—This sometimes follows renal colic, but it may appear independently, or at most be preceded by a mild, hardly noticed colic.

At the outset and for the first three or four days, *medical treatment* may suffice. It consists of rest in bed, the use of milk and diuretic beverages, and wet cupping over the lumbar region. An attempt may also be made to reawaken renal secretion by means of theobromine, by intravenous injections of 4 per cent. glucose solution, or by sparteine, which acts favorably on the kidneys by improving the cardiac contractions. Lastly, an endeavor should be made to induce reflex stimulation of the kidney by distention of the bladder or by ureteral catheterization; the latter procedure may be successful in putting an end to the anuria by mobilizing a reno-ureteral stone.

When all these measures fail, there remains but one resource, *viz.*, *surgical treatment*. The operative intervention must be decided on in due time; each day of delay after the fourth day reduces the chances of a successful outcome of the operation.

The latter consists usually of a *nephrostomy*, or of a *nephrolithotomy* or *pyelotomy* or even a *ureterotomy*, according to indications in the individual case.

Operation presupposes knowledge of which side is involved. The location of the pain, the rigidity on the affected side, the results of bimanual palpation, ureteral catheterization and the appearance of the orifice of the ureter during cystoscopy, and above all, the X-ray examination are the data upon which the diagnosis of the location of the calculous condition is based. In some instances, however, one may be led to operate on both sides in succession; if need be, local anesthesia may be sufficient for a quickly performed operation.

(b) **Calculous Hydronephrosis.**—This consists merely of retention in the kidney above the obstruction formed by the stone, and requires surgical relief, which need not be further discussed here.

(c) **Septic Complications of Renal Calculi.**—Infection is often superimposed upon the presence of kidney stones. At times, indeed, in the case of the secondary phosphatic calculi, it precedes the calculous condition and is its direct cause.

Calculus infection of the kidney ranges from a simple pyeloureteritis to pyonephrosis. It is manifested clinically in pyuria, increased size of the kidney, pain, and hematuria, of small amount and repeated, or coming on after fatigue; greater precision in the diagnosis is obtained by radiography.

The treatment is solely surgical, consisting of nephrotomy or nephrectomy, primary or secondary.

In short, when, on the basis of the aggregate of modern diagnostic methods, the presence of one or more stones in the kidney is clearly demonstrated, and especially when the stone or stones are accompanied by persistent and distressful symptoms (pain, hematuria), and when the stone is causing morbid changes in the affected kidney (enlargement, septic renal retention, pyuria), an absolute indication for surgical intervention exists.

The nature of the operation and its exact indications vary in different cases.

FIRST POSSIBILITY.—*A unilateral renal stone in a kidney which is not enlarged and not infected.*

Nephrotomy or *pyelotomy* is formally indicated under these conditions, and the operative prognosis is very favorable when the operation is performed in a young, healthy individual and the opposite kidney is in good condition.

Pyelotomy, whenever it is feasible, *i.e.*, when the stone is situated in the renal pelvis and can be easily reached by this route, is preferable to nephrotomy. It is a far less serious operation, more simple in its aftermath, and often easy to perform.

Nephrotomy, while not a serious operation in a number of cases, is frequently a serious operation in obese patients and in those who have been suffering from stone for a long time, with the opposite kidney in a doubtful condition or actually insufficient.

SECOND POSSIBILITY.—*Stones in an enlarged and infected kidney.*

When examinations show that the opposite kidney is sound; when the existing condition is a unilateral calculous pyonephrosis, nephrectomy is often a simpler, safer and more certain procedure than nephrotomy.

In cases in which there is doubt concerning the other kidney, or when there is present a large pyonephrosis of long standing, with marked perinephritis, a two-stage operation is indicated and nephrectomy should be carried out only after an earlier anesthesia and temporary drainage of the kidney.

THIRD POSSIBILITY.—*Stones in both kidneys.*

The operative procedure should first be directed to the kidney which is the least involved and, if possible, pyelotomy should be resorted to rather than nephrotomy. Later, if conditions are favorable, the other kidney should be dealt with; removal of it may have been rendered feasible by the earlier procedure.

CAUSAL TREATMENT OF NEPHROLITHIASIS.

URIC LITHIASIS.—Apart from the acute manifestations and complications calling for symptomatic treatment, the curative and prophylactic treatment of suspected, threatened or established uric lithiasis is, in general, that of *uricemia* and of *gout*.

Its basic principles are these:

1. Exclusion from the diet of purin-yielding articles, reduction of the nitrogenous food, and a general diminution of the diet, in order to avoid plethora, excessive circulation of fat in the blood, and uratic deposits.

2. Systematic physical exercise, constituting a progressive and graded myotherapeutic treatment, with hydrotherapeutic procedures suitable for the maintenance of the muscles, heart and lungs in a good functional state.

3. From time to time, diuretic treatments, with dissolution and elimination of small uric acid concretions.

4. When thought advisable, the additional alternate administration of uricolytic drugs.

Following, for example, are the **instructions** that may be given to a case of *uric gravel*, *plethoric and robust*, without any established cardio-renal impairment.

I. Diet.—There should be interspersed occasionally (once to three times a month), days of restriction to fluids or a fruit diet or a milk diet (2 liters), or even Guelpa treatments (restriction to fluids and purgation with sodium sulphate).

Articles Allowed:

Lean ham, smoked tongue, oysters, olives, radishes, celery (in moderation). Among the *meats*, beef or mutton preferably, veal or pork only exceptionally. *Fowl*. *Lean fish*: Sole, whiting, fresh cod, perch, pike, trout, etc.

Fresh vegetables: Potatoes, carrots, celery, beets, salsify, artichokes, egg-plant, tomatoes, leeks.—*Green vegetables and salads*: Endive, raw or cooked salads (including corn salad, dandelion and chicory).

Fresh fruits: Apples, pears, peaches, grapes, plums, apricots, strawberries, raspberries, currants, oranges, tangerines, fresh figs.

Fresh cheese.

Biscuits; dry cakes.

Bread: Toasted or soft crust.

Beverages: Water, infusions, cider, wine.

Milk and milk products.

Articles Forbidden (or at least to be avoided):

Brains, sweetbreads, eggs.—Young meats (veal, lamb, pigeons, chicken).—Gelatinous meats (calves' head and foot).—Kept or pickled meats.—Fat fish and crustaceans.

Sugar and sweet foods, including preserves, desserts, pastry, confections (to be taken only in moderation).—Fats, sauces, ragoûts and fatty foods.—Starches, flours and pastes (beans, peas, chestnuts, rice, noodles, macaroni, etc.).

Mushrooms, sorrel, spinach and string beans.

Viscera, game, pork products, preserved meats and fermented cheeses.

Tea, coffee, chocolate, cocoa, heavy wines. Meat bouillon. Alcohol and liquors.

Culinary Remarks:

Meats and fowl: Broiled or roasted, without sauce.—*Fish:* Boiled, with fresh butter and lemon juice added just before serving.—*Eggs:* Preferably boiled or poached, or the yolks alone.

Vegetables: Cooked in water, with fresh butter and lemon juice added before serving.

Salads: Cooked, or raw if very tender, seasoned with a little salt.

Fruits: Cooked with very little sugar, or raw if thoroughly ripe.

Thick soups: Purée of vegetables, strained or with milk.

Amounts:

Meat, fowl or fish: At the noon meal only, 200 grams at most.

Eggs: One or two at the evening meal.

Milk: 200 c.c. in the morning.

Bread: 150 grams at most.

Vegetables: *Ad libitum.*

Salt: In moderation; salt meats to be avoided.

Beverages: One large glassful (250 c.c.) at meals.

Soups: In moderation.

II. Exercise.—Each morning, with the window open if the season permits, the patient should spend a half hour in gymnastic exercises (see Part II: *Kinicsitherapy*), interrupted by some hydrotherapeutic procedure (sponge bath or warm, cool or cold douche, according to tolerance) and followed by a general rub.

Walking should be favored, and sports indulged in.

III. Drug Treatment.—*For ten days in each month:*

Diuretic medication.—The patient is to take on awakening and before retiring (and, if possible, a third time about 10 a.m.), a tumblerful (200 c.c.) of a mineral water of the type of Évian, Vittel or Contrexéville or a large cupful of infusion (infusion of ash leaves, infusion of black currant with addition of lemon juice, “imperial drink,” etc.).

For the next ten days:

Alkaline solvent medication.—In the morning, on an empty stomach, and one-half hour before the noon meal, a glassful (150 to 200 c.c.) of warm Vichy water (Grande-Grille or Hôpital).

For the last ten days:

Uric acid solvent medication (see Part I: *Uricolytic Diuretics*).—In alternation:

(a) Lithium benzoate: Cachets of 0.5 gram ($7\frac{1}{2}$ grains); three cachets daily between meals with a half glassful of water.

(b) Lycetol: One teaspoonful three times a day between meals in a half glassful of water.

(c) Piperazin: One teaspoonful three times a day between meals in a half glassful of water.

(d) Solurol (thyminic acid): One tablet or cachet of 0.5 gram ($7\frac{1}{2}$ grains) three times a day between meals.

(e) Haarlem oil: Globules each containing five drops of the oil; three globules at breakfast.

(f) Cinchophen (atophan): Four to eight tablets a day.

IV. If possible, a course of treatment at a **watering place** once a year.

(a) Resorts of the type of Vittel, Contrexéville, Évian and Martigny.

(b) In the event of complicating hepatic disturbance, associated cholelithiasis or gout complicated with hepatic disorder, resorts of the type of Vichy, Vals and Pougues.

PHOSPHATIC LITHIASIS.—Rather excessively overshadowed by its counterpart, uric lithiasis, with which it may, indeed, perfectly well be combined or alternate, this condition is attended by an exactly opposite disturbance of metabolism, as is well brought out in the contributions of Joulie.

Uric lithiasis, a clinical morbid expression of uricemia, is attendant upon hyperacidity of the body fluids, and is related to gout. It calls for a diet low in purins, and alkaline and uricolytic medication.

Phosphatic lithiasis, a clinical morbid expression of calciemia, is attendant upon reduced acidity of the body fluids, and is related to arthritis deformans. It calls for a diet low in calcium, and acid and laxiant medication. The alkalies do harm in this condition.

Thus, it will have been noticed that these two forms of lithiasis are, in a sense, opposite conditions and call for very different treatment. The reader will also have been impressed with the importance of frequent tests of the urinary acidity if a haphazard kind of treatment, to the great detriment of the patient, is to be avoided.

In this connection the following directions might be given:

I. *Exercise in moderation.* General rubs daily. If possible, residence in a warm, dry climate. Hot air baths and douches.

II. *For ten days in each month:*

Acid medication:

℞ Acidi phosphorici diluti	50 c.c.	(f3xiiij);
Sodii biphosphatis	20 grams	(5v);
Aquæ destillatæ	160 c.c.	(f3vss).

M. Sig.: Two to four teaspoonfuls at noon and two teaspoonfuls in the evening, after meals, in a half glassful of water.

For the next ten days:

Morning and evening: A glassful (200 c.c.) of a mineral water of the type of Évian.

For the last ten days:

No treatment.

III. *Diet low in calcium.*

Articles Allowed:

Lean or milk soups.	} At one meal only, in limited amount: 80 to 120 grams.
Butcher's meats (beef, mutton and exceptionally veal).—Fresh water fish: Trout, pike, etc., except salmon and eels.—Sea fish: Sole, whiting, etc.—Fowl.—Rabbit.	
Milk.—Cheese.	
Legumins (beans, lentils).	
Green vegetables (green peas, string beans, lettuce, cooked chicory).	
Eggs: Not more than one.	
Potatoes, carrots, rice, pastes, sweet potatoes, turnips, salsify.	

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Curdled milk: 120 to 150 c.c.

Raw fruits: Oranges, grapes, strawberries, currants, cherries, plums, pears, apples.

Cooked fruits: Fruit confections, marmalades, jellies, compotes.—

Dry cakes. Puddings; rice cakes.

Beverages: Water, lemonade; aromatic infusions; cider.

Bread: Toasted or soft crust (120 grams at the most).

Articles Forbidden (or, at least, to be avoided) :

Mushrooms, sorrel, spinach, truffles.

Viscera, game, shellfish, pork products, preserved meats, strong cheeses.

Chocolate and cocoa.

Culinary Remarks:

Meats and Fowl: Broiled or roasted, without sauce.

Fish: Boiled, with fresh butter and lemon juice.

Eggs: Preferably boiled or poached, or the yolks alone.

Vegetables: Boiled, with addition of fresh butter and lemon juice just before serving.

Salads: Cooked, or raw if very tender, with little salt and preferably lemon juice.

Fruits: Cooked with very little sugar, or raw if thoroughly ripe.

Thick soups: Vegetable purées, strained or with milk.

Amounts:

Meats, fowl or fish: At one meal only.

Eggs: One or two.

Milk: 200 c.c. at the morning meal.

Bread: 120 grams.

Salt: In moderation.

OXALIC LITHIASIS.—This is characterized either by a *typical attack* of renal colic or, remaining more or less latent, by the usual symptomatic triad of calculous pyelonephritis: Lumbar pain, albuminuria and hematuria.

In either instance there is really but one positive evidence of the condition, *viz.*, the observation in the urine of oxalic crystals or stones or the presence of oxalic acid in excess. Aside from this, the clinical history of oxalemia is still indefinite. Let it be noted simply that, in the presence of a clinical picture combining dyspeptic gastro-intestinal disturbances with attacks of pain, pyelonephritic urinary mani-

festations, rheumatoid pains and general depression (weakness, demineralization, decalcification), oxalic lithiasis should always be thought of.

The therapeutic conclusions expressed by Loeper at the 13th Congress of Medicine afford the best guidance so far offered for the treatment:

Treatment of Oxalemia.

1. Institute a diet containing as little as possible of the products containing oxalic acid or capable of forming it. Tea, cocoa, chocolate, pepper and sorrel should be interdicted; the intake of meat reduced, and nucleins, purins and gelatin avoided.

2. Alkalinize the intestinal contents in order to diminish the absorption of oxalates; this results in the precipitation in the intestine of the soluble oxalates in the form of calcium oxalate, which is less easily absorbed.

3. Diminish the formation of oxalic acid by the tissues, activate the processes of oxidation, and stimulate the hepatic function.

4. Detoxicate the harmful material, if it is formed, by suitable chemicals, *vis.*, the salts of calcium and magnesium. Calcium chloride facilitates the formation of calcium oxalate, while magnesium sulphate and citrate form magnesium oxalate, which is free of toxicity and rather soluble.

5. Favor its elimination by the emunctories. The purgatives and diuretics will activate its elimination through the bowel and kidneys. Hexamethylenamin deserves special mention in this connection.

6. The harmful material should be solubilized, in order to increase such elimination further. Aside from the salts of calcium and magnesium, use may be made of phosphoric acid and the acid phosphate of sodium, sodium citrate and piperazin.

7. The system should be remineralized and, in particular, recalcified.

In all oxaluric cases the nervous system and the muscles and bones suffer from demineralization, which affects especially the calcareous substances. Recalcification may be carried out by the mouth or hypodermically, and may involve the use of either direct or indirect calcifying agents. The chief indirect calcifying agent is phosphoric acid; the bi-phosphates, glycerophosphates and hypophosphites of calcium are direct calcifying agents, but they supply calcium of low absorbability.

8. *Conclusion.*—In a case of marked oxalemia, ingestion of oxalates must, in the first place, be arrested by a *suitable diet* and a *purge*; this is to be followed by the giving of drugs such as *sodium citrate* and *phosphate*

which become diffused in the system and assist in the solubilization of the oxalate. Then *phosphoric acid* should be given, further increasing the solubility of the calcium oxalate, and *piperazin* and *hexamethylenamin*, which hasten its elimination. Lastly, hypodermic *injections* of painless, soluble *calcium salts* should be given, to assist in the necessary mineralization of the organism.

III.—PYELONEPHRITIS.

PYELONEPHRITIS.—URETERO-PYELONEPHRITIS.—PYELITIS.—Under these terms I include all forms of non-specific supuration in the ureters, renal pelves and kidneys, in the absence of retention and of any obstacle to the outflow of the purulent secretions (in the presence of which the pyelonephritis becomes a pyonephrosis). Thus defined, pyelonephritis is a very common condition ranging from a mild, superficial inflammation of the renal pelvis and ureter (with or without concomitant nephritis) to definite suppuration, and from evanescent turbidity of the urine with more or less pronounced leukocytosis to the thick, heavy pyuria of prolonged suppuration.

Sometimes of **hematogenous** or **descending origin**, it makes its appearance in the course of or following an acute infection (typhoid or post-typhoid pyelonephritis, influenzal pyelonephritis, pyelonephritis of various forms of septicemia, etc.). At other times it follows a more or less permanent obstruction to the outflow of urine; the congested kidney then falls an easy prey to the action of the intestinal bacteria and infection takes place by the **lymphatic route** (pyelonephritis of pregnancy, pyelonephritis of intestinal origin, Heitz-Boyer's entero-renal syndrome). Lastly, it may have as its starting-point an **ascending infection** of urethral, prostatic or vesical origin.

Pyelonephritis is sometimes associated with outstanding symptoms (high fever [39-40° C.—102.2-104° F.], chills, lumbar pain, abundant pyuria); at other times, on the contrary, it runs a quiet course, with a minimum of symptoms (moderate fever, signs of a slight cystitis, slight evidences of suppuration in the urine), and in this attenuated form it may persist for a considerable time, whereas the acute form is generally of but short duration.

While very easy to diagnose when it is thought of, pyelonephritis is often overlooked, being imperfectly described among symptoms that are not referred to their true cause. It should always be thought of in the parturient woman, for instance, or in the prostatic patient with distention, and at the least suspicion in this direction, when there is

present a moderate, persistent fever which cannot be accounted for, the urine should be systematically collected in a jar; the more or less abundant deposit formed at the bottom of the receptacle will confirm the diagnosis, which is to be completed by an examination of the kidney.

Serious mistakes will thus be avoided, and especially will be avoided alarm and useless operations in some cases of puerperal sepsis, for the pyelonephritis of pregnancy or the puerperium is far less dangerous than uterine infection; in such a case, however, to avoid unfortunate results, the diagnosis of pyelonephritis should not be decided on without having made a careful examination permitting of the exclusion of all uterine involvement.

The **medical treatment** comprises, in the first place, rest in bed; in the presence of renal pain, hot fomentations and wet cupping are useful; when the pyelonephritis takes the form of a septicemia, antiseptic intravenous injections of colloidal silver are indicated, but the principal indication in the treatment is to increase urinary elimination by *copious ingestion of fluid, diuretic infusions*, and the *milk diet*, while in the meantime the septic cause is being treated by internal antiseptics. *Methenamine* is the drug most strongly indicated, which gives the best and most constant results. It is well to give it in divided but rather large dosage (up to 4 or 5 grams—60 to 75 grains—a day); sometimes its intravenous administration (0.5 gram—7½ grains—per cubic centimeter of solution) will be found advantageous. The results are excellent, and there is reason to lay stress on this as yet little recognized procedure.

Helmitol (3 to 4 grams—45 to 60 grains—a day) may be availed of; or phenyl salicylate (3 to 5 grams—45 to 75 grains—a day) given cautiously, with observation of its effect on the kidneys; or camphoric acid (1 to 3 grams—15 to 45 grains—a day), benzoic acid or sodium benzoate, alone or in conjunction with methenamine.

It is very important to insure proper functioning of the bowel at the same time by carefully combating constipation with free irrigations, enemas and purgatives.

In some cases, benefit will accrue from **distention of the bladder** carried out according to the directions given by Pasteau: The bladder is filled with a weakly antiseptic fluid until a certain amount of distention is produced; this results in an opening up of the orifices of the ureters and, no doubt, in a reflex contraction of the ureters which facilitates their evacuation.

Vaccine therapy in pyelonephritis, pyelitis, and pyelocystitis is now standard practice. There is no doubt that it often succeeds where other methods have failed.

Stock vaccines are especially indicated in urgent cases when it is practically impossible to isolate the infecting germ.

The superiority of *autogenous vaccines* is admitted by the majority of writers. Their action is advantageous in being exerted, as it were, in an homologous manner with respect to the infection, and the shock produced is generally less. They are usually administered hypodermically, but some prefer intravenous injection.

Serum therapy results in a *passive immunity*, the antibodies being brought already prepared to the diseased organism. Up to the present time, however, serum therapy in urinary infections has met with numerous difficulties.

The **surgical treatment** is indicated in severe cases.

The simplest procedure is **lavage of the renal pelvis through the ureteral catheter**. The irrigation treatments may be repeated at rather short intervals. Sometimes, allowing the ureteral catheter to remain *in situ* for a time proves of benefit.

If ureteral catheterization has proven insufficient to improve the general condition, the latter remaining serious, a more radical surgical procedure must be considered. The functional capacity of each kidney having previously been determined by ureteral catheterization, one may be led to perform a **nephrectomy** (where one of the kidneys is in a definitely bad condition while the other appears sufficient and less infected) or a **nephrostomy**.

Indications applying to certain forms of pyelonephritis:

One should endeavor to ascertain the cause of the pyelonephritis.

If the condition is due to a temporary pressure on the ureter (pregnancy) the treatment may remain exclusively medical, though at times it may be necessary to resort to a nephrostomy or to induction of labor. In the case of a permanent pressure on the ureter (fibromyoma or an abdominal tumor), the cause of the obstruction will have to be removed. In the case of a pyelonephritis attending movable kidney, nephropexy is indicated if the wearing of a supporting belt fails.

When the infection of the kidney and of the renal pelvis appears related to what Heitz-Boyer has termed the "entero-renal syndrome," it is necessary to be very careful in disinfection of the intestine by repeated purging, in particular with castor oil, by the use of lactic ferments, and by an appropriate diet.

The *entero-renal syndrome* is often caused by an enlarged colon; the attempt should be made to bring about progressive evacuation of the latter by appropriate measures (massage, abdominal exercises);

at times even the possibility of surgical intervention must be considered (appendectomy, plication or exclusion of the cecum).

When pyelonephritis is due to an obstruction situated lower down, the surgical procedures should be directed to this obstacle (urethrotomy and dilatation of strictures; treatment of prostatitis). In the prostatic subject, pyelonephritis may be improved by the indwelling catheter, judiciously employed, or by temporary cystostomy, which, by disinfecting the kidney, will prepare the way for prostatectomy (two-stage prostatectomy).

IV.—TUBERCULOSIS, SYPHILIS AND CANCER OF THE KIDNEY.

TUBERCULOSIS OF THE KIDNEY.

By reason of its frequent occurrence and the serious nature it assumes when *overlooked* or *poorly treated*, renal tuberculosis is a condition of marked interest.

There are some definite features relating to it which all should keep in mind.

1. **Any cystitis of obscure causation**, which can be positively ascribed neither to a stricture, an acute, subacute or chronic urethroprostatitis, nor a stone or neoplasm, **should lead to the thought of a possible renal tuberculosis.**

2. **Primary tuberculous cystitis is practically non-existent.**

Consequently, whenever tubercle bacilli are found in the urine, examination of the kidneys is required.

3. **Any total hematuria appearing suddenly, without cause, should suggest the possibility of renal tuberculosis.** These initial hematurias are comparable to the initial hemoptysis of beginning tuberculosis. They point to the need of a thorough examination of the case.

4. **Certain mild symptoms are valuable indications.**

Such are: *Incontinence of urine* in the daytime or at night in an adult; *frequent painful urination*; pains in the bladder with *slight pyuria*, sometimes noticeable only under the microscope, or with the urine slightly turbid and discolored. The significance of all these symptoms is rendered all the greater by a negative history as to urinary or venereal disorders.

5. **Beware of these symptoms when they appear in an adult male:** Renal tuberculosis is not a specialty of youth.

6. **The need of early treatment** should be thoroughly realized. Delay only results in aggravation of the manifestations of cystitis,

allows the tuberculous lesions of the bladder to become firmly established, facilitates secondary infection, and entails a risk that the curative treatment—early nephrectomy—will not be followed by rapid recovery, as the bladder, remaining diseased on its own account, perpetuates the pain and poor general condition of the patient and compromises the chances of recovery.

7. It may be put down as a **general rule** that:

Tuberculosis of the kidney is nearly always of hematogenous or lymphatic origin. It is **nearly always unilateral at first**. The other kidney becomes involved only late, but as long as the disease of the affected kidney remains, the sound kidney is unfavorably influenced. **Elimination of the diseased kidney improves the function of the sound kidney.**

In some cases of bilateral renal tuberculosis, removal of one kidney may be justified where one of the two kidneys is seriously involved (painful pyonephrosis with fever) and the other only slightly.

In short, the necessity of an early diagnosis must be kept in mind. Modern methods of examination permit of such early diagnosis.

Given a patient whose examination awakens a suspicion of renal tuberculosis, one should:

1. Confirm the diagnosis and ascertain the location of the disease.
2. Determine the respective functional capacities of each of the two kidneys, and even the actual existence of two kidneys (as a single kidney is unfortunately more common than is generally realized).

It is usually easy to solve this twofold problem by *ureteral catheterization*, whereby the urine from each kidney can be collected separately, a bacteriologic analysis of it made, and soundness of the healthy kidney checked up by a *functional examination*.

The chemical examination should bear especially on the urea percentage. A sound kidney eliminates *on an average* 0.8 gram of urea in two hours, the usual duration of a ureteral catheterization.

To this chemical examination are to be added the determination of the blood urea (the normal content being about 0.40 per 1000) and the determination of phthalein elimination. Normally, after an injection of 0.006 gram of phenolsulphonphthalein into the blood, one should recover at the end of one hour and ten minutes 50 to 60 per cent. of the quantity injected, or 30 per cent. for each kidney.

Colorimetric determination of this elimination may be made in a very simple manner, within the reach of any practitioner, with simple devices now on the market.

Determination of the ureosecretory (Ambard's) coefficient may be carried out as a supplementary test.

The **medical treatment** of tuberculosis of the kidney by hygienic measures, sunlight treatment and serum therapy should not be allowed to waste valuable time. Comparison of the few and very questionable cases in which it seems that the natural course of the disease, with its possible remissions, may have led to the belief that a cure under medical treatment had been effected—even if there remained a few fortunate cases in which a cure had actually been obtained—with the much more numerous cases in which a useless, vacillating policy and an unfortunate lack of familiarity with the actual active means of treatment available have caused the physician to allow a tuberculous condition to continue on its course and compromise the results of a later operative intervention, leaves no room for hesitation.

When one has seen, as I too often have, patients slowly and painfully regress toward a fatal termination on account of an unaccountable stubbornness on the part of the medical attendant, or when one sees patients, whom an early nephrectomy should otherwise have cured, remain invalids on account of a cystitis that has been allowed to become too firmly established before operation, and when, furthermore, one realizes the operative safety, as regards the renal function as a whole, of an early nephrectomy while the opposite kidney is sound, hesitation is no longer possible and the treatment to be applied is that which the physician would accept if his own person were concerned, *viz.*, radical intervention in the form of a **nephrectomy**, performed soon after the diagnosis has been firmly established.

Postoperative Treatment.—After nephrectomy, “the rôle of the surgeon is ended,” said Guyon, “and it is incumbent on the physician to take up his own.”

To improve the general condition remains the first indication, and sometimes the only effectual one.

The bladder may, however, remain painful for a period which is sometimes considerable, and call for certain suitable therapeutic procedures.

Those preferably to be availed of are:

1. Instillations of 1:8000 mercury bichloride solution without alcohol nor tartaric acid.
2. Instillations of medicated oils containing vioform, gomenol, guaiacol or iodoform.

Quite recently Prof. Marion and his pupil H. Blanc have recommended instillations of methylene blue into the bladder, which have given them results far superior to those hitherto obtained.

The technic employed by these observers is as follows:

(a) A solution of methylene blue is procured which is *chemically pure*, with the compound in *perfect solution* in physiologic salt solution; the solution is *filtered* before use.

(b) The liquid is to be injected warm and slowly, after evacuation and, if necessary, slow and gentle irrigation of the bladder.

(c) The amount of drug to be injected at one time is 5 to 10 c.c. (80 to 160 minims), *at the most*, of a 1 per cent. solution.

3. The specialist disposes of a still more effective treatment, *viz.*, high frequency spark treatment.

CANCER OF THE KIDNEY.—Cancer of the kidney is one of the forms of cancer which warrants the best hopes of permanent recovery when the diagnosis is made early. But, in the majority of instances the condition is not recognized until late, and the results of operation are then poor—indeed, often it is best to give up the idea of operating.

The same considerations that apply to tuberculosis of the kidneys hold good in the case of cancer: It is by thinking early of the possibility of the condition, by being on the alert upon observation of the least suggestive symptom, and especially by taking into account in time the fortunate warning that may be afforded by an abruptly and unaccountably appearing total hematuria, and by carrying out the necessary procedures of clinical examination, that one may succeed in operating for cancer of the kidney at a favorable time.

In this condition the diagnosis is often particularly difficult, even after a properly conducted functional examination of both kidneys. Yet, the observation of a functional inferiority of one kidney, especially in the absence of pus and tubercle bacilli, with a very special abundance of kidney cells and a few casts on one side, and at the same time an X-ray examination that is negative as regards stone and a more or less perceptible enlargement of the kidney which has been shown by the tests to be of inferior functional capacity and physical examination of which elicits some degree of sensitiveness, renders the diagnosis of neoplasm of the kidney highly probable and warrants operative intervention.

SYPHILIS OF THE KIDNEY.—Renal syphilis is a common condition. Syphilis may affect the kidney in several different ways:

1. It may give rise only to a mild disturbance of the organ, featured mainly by albuminuria and a slight functional deficiency.

2. Sometimes there is a true nephritis with the entire aggregate of manifestations of insufficiency (azotemia of high degree; uremia).

3. Tertiary syphilis may involve the kidney either through the production of a chronic nephritis or the production of gummas or

by facilitating the occurrence of amyloid change. It might also be responsible for certain renal disturbances such as paroxysmal hemoglobinuria.

Congenital syphilis may involve the kidney:

1. In its diffuse and acute manifestations, shortly after birth.
2. Later, it may be responsible for some cases of interstitial nephritis or may even give rise to inherited gummas.

The treatment of renal syphilis is that of syphilis in general.

V.—RENAL HYPERPERMEABILITY. AMYLOID DEGENERATION OF THE KIDNEYS.

Mention should be made of a urinary syndrome as yet comparatively little studied and which probably plays an important rôle in many conditions of nutritive and nervous degeneration, *viz.*, the **syndrome of renal hyperpermeability**.

Routine use of modern procedures of examination of the circulation seems destined, as will be seen, to throw much new light on this question.

Case 439 (Fig. 272), seen with Castaigne and M. Chailloux, is a most typical one. The patient was a man aged 61 years, without any noteworthy morbid history, who, following what was probably an influenzal infection, lost weight and became weak; uranalysis carried out at this time showed 3 grams of albumin and rather many hyaline and granular casts.

I saw him in January, 1913; the systolic blood-pressure was 210 mm. Hg and the diastolic, 110; the blood viscosity, 3.6, and the daily output of urine 1600 c.c., giving a renal yield of 0.160. The ureosecretory (Ambard) coefficient was 0.15, with the blood urea at 0.65. The albumin in the twenty-four hour specimen was 3 grams; casts were present. The alimentary chloriduria test did not show any notable chloride retention; there was no edema; no signs of heart weakness and no toxemic manifestation. The large amount of albumin, the high ureosecretory coefficient and the presence of casts caused me to be very guarded as to the prognosis, although this was certainly not warranted by the clinical examination, which was, on the whole, satisfactory. The later course of the case only too plainly justified the prognosis given.

Nothing availed to check the progressive degeneration of the kidneys, and, as is sufficiently well shown in the annexed chart, there were observed: A progressive increase in the degree of albuminuria,

which, from 3 grams, rose to 5, 8 and 10 grams, finally becoming fixed at about 7 grams; an increase in the permeability of the kidneys to water, probably of glomerular origin, since polyuria was seen to set in and the sphygmo-hydruric ratio to rise gradually from 0.160 (sub-normal) to 0.360 (above normal); a progressive sagging of the systolic, diastolic and pulse pressures and of the blood viscosity. With the blood urea scarcely above normal (0.65; 0.48), the ureosecretory coefficient remained poor (0.15; 0.17; 0.26), although at no time were there actually any clinical manifestations of azotemia. But what dominated the clinical picture concurrently with the rise in the

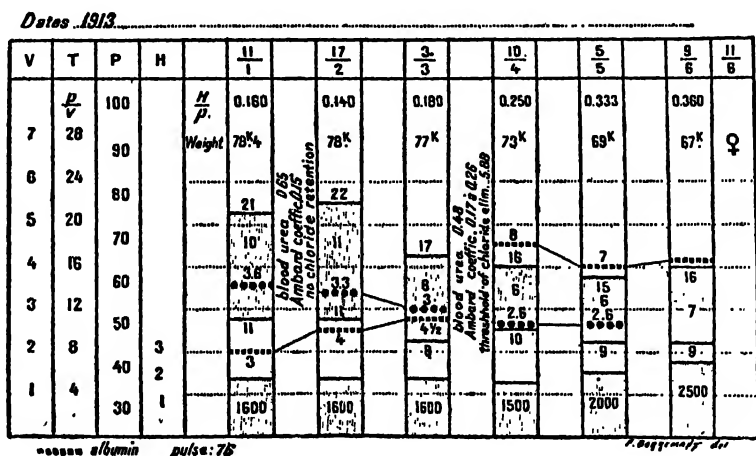


Fig. 307.—Case 439. Acute renal hyperpermeability. (Blood-pressures, systolic and diastolic, in centimeters of mercury).

amount of albumin and the sphygmo-hydruric ratio was the rapid impairment of nutrition (loss of 11 kilograms—24.2 pounds—in less than five months) and progressive cachexia, to which the patient succumbed in July, with final manifestations of heart failure (weakness, premature contractions, a loud systolic murmur at the base and apex, a heart-rate of 134, passive edema at the bases of the lungs, painful enlargement of the liver, and enlargement of the spleen, without appreciable edema of the lower extremities).

The increasing amount of albumin, the increasing output of water with the urine, in conjunction with the sagging of the systolic, diastolic and pulse pressures, lead inevitably to the conception of the "pierced kidney" or "burst glomeruli" with secondary nutritive impairment and cachexia. On the other hand, there is to be noted the increasing impermeability to urea. The hyperpermeability is thus

not a total one, but seems to relate specifically to water, albumin, and probably salts.

This was a typical case of **progressive and cachexia-producing renal hyperpermeability running an acute course.**

The following case—Case 143 (Fig. 273)—is, on the other hand, a typical example of renal hyperpermeability running a **chronic course.**

Here again we find at the beginning, in May, 1911, an ill-defined infection which I did not witness, but which the patient describes as having started with an apparently spontaneous swelling of the lids and forehead, which is stated to have been followed by a sudden parotid hyperemia of six weeks' duration. X-ray treatment and

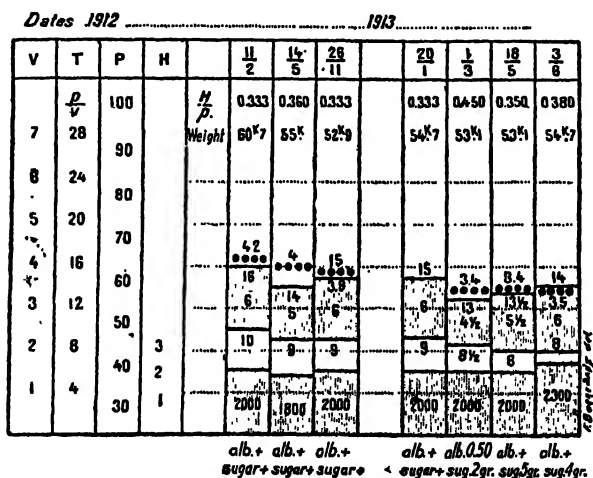


Fig. 308.—Case 143. Chronic renal hyperpermeability.

iodide and arsenic given at this time are stated to have been followed by a purpuric eruption over the lower extremities. The parotid congestion and purpura had finally disappeared, leaving behind a complete suppression of salivary secretion, anosmia, polyuria, traces of albumin, a little sugar (2 to 3 grams), and progressive loss of weight. The patient, who had weighed 71.6 kilograms (158 pounds) in May, 1911, weighed only 60.7 kilograms (133 pounds) at the time of my first examination in January, 1912. There was profound asthenia and low spirits.

The course in this case was very slow, but favorable, and in 1913 the degenerative process and denutrition were cut short, though there were noted, as in the preceding case, the presence of albumin (in low amount: 0.5 gram), hyaline and granular casts, hydruric hyperpermeability, and absence of edema and of all manifestations of azotemia.

The treatment was definitely tonic, roborant and remineralizant. A slight (a few grams) but persistent glycosuria is to be noted.

The patient has remained in a satisfactory state of health up to this time.

Thus, I have collected a number of characteristic cases of renal hyperpermeability, at least of hydruric and probably of mineral nature, exhibiting the definite symptom-group: Polyuria and impaired nutrition, normal or low blood-pressure, with an exaggerated hydruric coefficient (renal hyperpermeability). Likewise to be noted are the frequent presence of albuminuria and the possibility of a mild, intermittent glycosuria. A few of these cases might be considered instances of diabetes insipidus. Amyloid degeneration sometimes seemed very probable. All or nearly all the cases followed some infection.

The excessive permeability of the kidneys appears to be primary; the low blood-pressure and impaired nutrition secondary. It will be noticed that this type of condition is an absolute opposite to the syndrome of renal *hypopermeability* exemplified by interstitial nephritis with its secondary hypertension.

Concisely, one might put it thus:

Polyuria + high blood-pressure = Normal or diminished hydruric permeability.

Polyuria + low blood-pressure = Increased hydruric permeability.

Attention should be called to the frequent combination of hypoxypnoea with renal hyperpermeability; this is almost as common as the combination of arteriosclerosis and hypopermeability.

Treatment.—Here *general tonic* and *angiothentic medication* appears to be the most strongly indicated treatment. As a matter of fact, one observes clinically many transitional forms between certain kinds of renal hyperpermeability and certain kinds of hypoxypnoea.

The *diet* should be *generous, tonic* and *remineralizant*. It is particularly in these cases that stringent or reduction diets prove disastrous.

With these measures should be combined *angiothentic* agents (strychnine, adrenalin, sparteine); *remineralizing* agents (salts of calcium; calcium chloride, etc.), and *general tonic* agents (cinchona and glycerophosphates).

VI.—MOVABLE KIDNEY.—HYDRONEPHROSIS.

Movable kidney is nearly always associated with gastro-enteroptosis, and forms part of a condition of weakness of the sustaining tissues which perpetuates the impairment of equilibrium of the ab-

dominal organs. Yet, in some cases, the motility of the kidney is such that it dominates the clinical picture and may give rise to serious symptoms of renal retention in which there is risk that the function of the kidney will be gravely compromised (floating kidney with temporary repeated attacks of renal obstruction, which may or may not be followed by hydronephrosis).

In the cases in which mobility of the kidney is pronounced and in which it forms part of a more or less general visceroptosis, the wearing of a proper supporting belt is sufficient to remedy or reduce the symptoms.

All belts with a pad, directed solely toward overcoming the nephroptosis, **should be absolutely and deliberately rejected**; they are really nonsensical; to place a pad over a sagging or fallen kidney is to keep it in its abnormal position. The only rational proceeding, and the only one which gives appreciable results, consists in the wearing of a supporting belt which satisfactorily lifts up the lower abdomen; it should be a belt without lacers or cords, to be put on like bathing trunks, and which adapts itself closely over the lower abdomen, where it is held by straps. This belt has for its purpose to lift up the mass of intestines, and it indirectly antagonizes descent of the kidney. It is well to explain to the patients that they must put on the belt immediately on getting out of bed and must never go without it. The ease with which these belts are put on and the benefit experienced from their use render it easy for the patients to carry out these recommendations.

Where there is an actual "floating kidney," where it is very markedly prolapsed, or where the condition is accompanied by pain due to ureteral kinking and there is threatened renal retention or established hydronephrosis, surgical treatment is required. Preference should be given to nephropexy by the Albarran-Marion technic. *Hydronephrosis*, in particular *intermittent* hydronephrosis, is often a consequence of movable kidney.

It may, however, be due to other causes, *viz.*, *vascular or ureteral anomalies*, forming a sort of ureteral band which interferes with the free passage of the urine; *strictures or kinks* of the ureter; *ureteral calculi* and *obstructions* from various causes, and sometimes even urethral obstruction.

A *floating kidney* often has as remote consequence the formation of a hydronephrosis; in particular, the *small, painful hydronephroses* are often due to mobility of the kidney.

When hydronephrosis is due to renal mobility nephropexy may suffice in the treatment, but in some cases of hydronephrosis nephropexy is in-

sufficient. The surgeon will be able to estimate such difficulties and resort to certain more complicated operations, such as reimplantation of the ureter (ureteroneostomy) or reduction of the hydronephrotic sac (reefing of the renal pelvis); at times even nephrectomy may be indicated.

DISEASES OF THE DIGESTIVE TRACT.

BY LÉON MEUNIER, M.D.

THE STOMACH.

SOME CONSIDERATIONS LEADING TO RATIONAL TREATMENT.

DYSPEPTIC PAIN.—The dyspeptic form of pain described in all treatises on internal medicine consists of more or less severe discomfort coming on after meals and of more or less acute pains which do not appear until several hours after meals.

These two symptoms appear either alone or together, often so coalescing as to confound the clinician who attempts to give a comprehensive description of the condition.

Now, after more than twenty-five years of gastro-enterologic practice, I have come to the conclusion that all the patients whom we see passing before us, whether mildly or severely ill, and *whether suffering from functional or organic disease*, from affections involving the stomach itself or involving the sub-hepatic area, appear to be of the same kin.

From this it must be concluded that this dyspeptic state is not a morbid entity, but a painful syndrome devoid of nosologic specificity, and which relates to all gastric, duodenal and hepatic disease. And if all these affections are thus akin symptomatically, it is because fundamentally they have a common pain pathogenesis.

To bring this pathogenesis to light, not for the vain conceit of building up a more or less ephemeral conception, but to deduce therefrom a plan of treatment, such is my practical aim.

Importance of Gastric Evacuation from the Therapeutic Standpoint.—Hitherto all treatment of the stomach has been directed against the disturbances of the gastric secretion.

This is an easy formula which, for the partisans of pure science, summarizes the treatment in the following simple directions:

You have stomach trouble? Then have your gastric juice analyzed.

If it shows hyperchlorhydria: Take alkalies.

If it shows hypochlorhydria: Take acids.

This too exclusive plan has now, indeed, been dropped, for everyone knows that a varying abundance of gastric secretion represents an individual trait and not a pathologic condition.

It is a physiologically absurd idea to look upon the stomach as being, above all, a secreting organ. Chemical digestion occurs in the duodenum, and the stomach is at the beginning of the digestive tract only as a reservoir calculated to empty its contents little by little into the intestine. Its principal function is a motor function, and its pathologic disturbances relate to evacuation.

We can prove this, indeed, by the following few examples: (1) Given a severe case of prolapse with evident poor evacuation, but without organic lesions; the patient suffers from indigestion. Put him in bed: *Evacuation is accelerated, and his trouble disappears.*

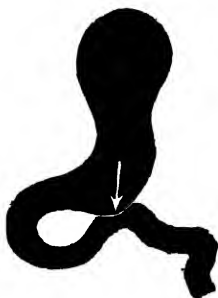


Fig. 309.—Evacuation reëstablished, with cessation of pain.

(2) Let us take as second example an organic lesion, *e.g.*, a patient with pyloric stenosis, of whatever nature. His gastric evacuation is *nil*, and there are severe gastric pains.

This patient is subjected to a gastroenterostomy, an operation simply promoting mechanical derivation, without disturbing the lesion (Fig. 309). *Gastric evacuation is restored; the stomach pains cease at once.*

This happens so frequently that many patients who have had a gastroenterostomy as the first stage in a more complete intervention refuse to undergo the second operation, considering themselves completely cured.

(3) Given a tumor of the body of the stomach. This tumor is palpable with the hand; the lesions are extensive, and secretion greatly disordered. The nervous ramifications and solar plexus must be under a severe test, yet *the patient suffers little* (Fig. 310).

Then, however, the lesion spreads from the body of the stomach to the pylorus; abruptly the evacuation, until then maintained, is compromised and the *pain element becomes established.*

(4) Let us take as a last example an opposite case—one of those stomachs disclosed by the X-ray, shrivelled, deformed, fibrotic, with an infiltrated pylorus showing on the screen the test meal escaping and at once invading the intestines (Fig. 311).

Here the lesion involves the stomach to the utmost extent, but pyloric evacuation is free, and the patient has no pain.

These examples could be repeated indefinitely, for deficient gastric evacuation is met with in nearly all stomach affections, which may be classified thus:

1. Affections involving the pyloric orifice: Cicatricial or cancerous stenosis of the pylorus; ulcer with pyloric spasm.
2. Affections involving the musculature of the stomach: Ptosis, dislocation, emaciation.



Fig. 310.—Large tumor, but with pyloric evacuation free (little pain).



Fig. 311.—Pyloric linitis and unduly rapid evacuation (no pain).

3. Affections bringing about a disturbance of the chemical work of the stomach and fatiguing the musculature through overlapping of the digestive periods: Cancer of the body of the stomach, gastritis, digestive troubles caused by deficiencies of dietetic hygiene, etc.

PATHOGENESIS OF THE PAIN ELEMENT.—If poor evacuation is at the bottom of the pain element, it is important to be familiar with the pathogenesis of this pain, in order to apply treatment that shall not be empiric.

From the results of my observations, I believe that this painful state is due to two causes:

1. Aërophagia.
2. Pyloric spasm.

Both of these are allied to poor gastric evacuation.

Aërophagia.—We are all aërophagic. The cushion of gas which forms the classic air bubble of every stomach physiologically regulates, along with the stomach musculature, the gastric output. The more the intragastric tension increases, the more the pressure on the surface of the stomach contents becomes enhanced and, according to the elementary principles of hydraulics, the more rapid is gastric evacuation.

In cases of vomiting, moreover, is it not by producing an artificial gas, as carbon dioxide, that one tries to regulate the gastrointestinal evacuation by thus reënforsing the air pocket and creating a sort of therapeutic aërophagia?

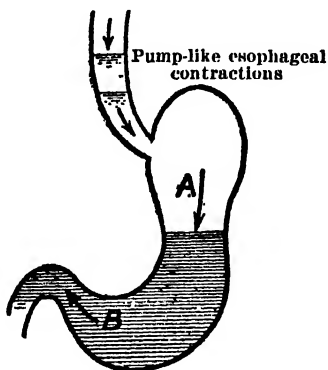


Fig. 312.—Gas pressure in *A* augments the outgo of liquid at *B*.

Correspondingly, when this evacuation is compromised the patient seeks unconsciously to reëstablish it by gulping several mouthfuls of extra air.

But, between the pump strokes regulated physiologically and those pathologically too numerous is only a step, which is quickly taken by the patient with muscular insufficiency, and aërophagia is established, with *all its painful consequences* (Fig. 312).

The pain manifestations induced by this aërogastric are of two sorts:

Gastric symptoms: Meteorism, eructations.

Extragastric compression symptoms:

1. From the cardiac plexus: Congestion of the face, palpitations, extrasystoles, pseudo-angina pectoris.

2. From the solar plexus: Epigastric uneasiness, heavy feeling, hiccough, dyspnea, etc.

Pyloric Spasm.—In order to understand the painful spasm of the pylorus, we must recall the *physiologic law of the acid control of the pylorus*, based on the experiments of Pawlow and of Cannon, and which may be summed up in the following sentence of Bayliss and Starling:

Any wall of the digestive canal is the seat of a local reflex by virtue of which a stimulus at any given point causes above a contraction of the muscle and below a relaxation.

This law, applied to the pyloric function, can be interpreted thus:

Given the pylorus as shown diagrammatically in Fig. 313 as a movable disk.

The gastric stimulus which is produced by the acidity of its contents is exerted in the direction of the arrow and causes a relaxation of the pylorus situated below (*gastric opening reflex*).

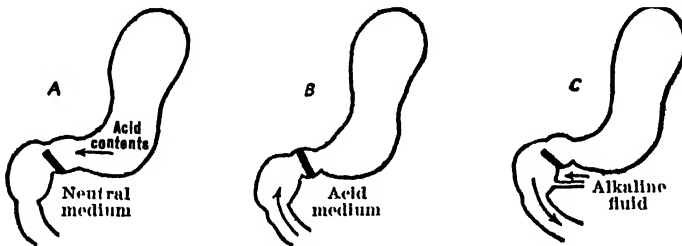


Fig. 313.

A, Opening reflex.

B, Closure reflex.

C, Alkalization of the duodenal contents and beginning of new cycle.

Reaching the duodenum, the acid contents acts in the opposite direction and causes a contraction of the muscle situated above (*duodenal closure reflex*).

At this juncture there arrives in the duodenal cavity the alkaline secretion from the pancreas and gall-bladder which neutralizes the acidity of its contents and arrests the closure reflex.

Anew the pylorus opens, and a second gastric outflow occurs.

Such is the principle of the normal opening and closing of the pylorus. But, for these outflows to recur regularly and rhythmically, secretions of the stomach and duodenum must be physiologically regulated the one by the other.

Any disturbance of the one leads to disturbance of the other, and it may occur in one of the following ways:

I. Above the pylorus (*gastric dyspepsia*): Production of a *prolonged* gastric flow.

This *prolonged* gastric secretion is very different from hyperchlorhydria, which, as has already been stated, cannot be the cause of the pain, because in all instances of painful gastric digestion every one knows that the greatest amount of hydrochloric secretion takes place in the middle of gastric digestion, whereas the pain appears only at the end, when the acidity is tending toward zero.

The experiments of Pawlow have shown that the chemical secretion of the stomach varies with the length of time the food remains in the gastric contents. Consequently, any unusual contact of chyme with the gastric mucosa may cause a *prolonged secretion* if the mucosa is capable of putting forth this effort.

Such unusual contact may occur:

(a) In affections of the type of muscular insufficiency, by too prolonged contact (quantitative hypercontact).

(b) In affections of the ulcerative type, of whatever nature, through hyperesthesia of the mucosa, through too abrupt contact with the bared nerve endings (qualitative hypercontact).

This prolonged secretion, moreover, is by no means simply a theoretic conception, for out of 3000 patients observed in the morning before breakfast we found 41 per cent. of cases with a prolonged gastric secretion, manifested, in the fasting state, by residual fluid having a hydrochloric acidity as high as 3:1000.

This explains why, in these numerous cases, this delayed acidity cannot be taken up by the duodenal contents and why it induces the painful spasm of the pylorus.

II. Below the pylorus (*duodenal dyspepsia*).—Here there is secretion of a duodenal and especially a biliary fluid insufficient to neutralize the gastric liquid reaching the duodenal cavity.

Two conditions may cause this:

1. Bile not qualitatively sufficiently alkaline (as we have been able to determine in calculous conditions).

2. Bile quantitatively insufficient, a too acid gastric secretion having brought about a momentary biliary hypersecretion; the classic stage of compensation is inevitably followed by fatigue of the liver cells.

Summing up, whether the trouble has its origin above or below the pylorus, it induces a painful pyloric spasm with the following two characteristics:

1. It appears late.

2. It is relieved by an alkali or some food which neutralizes or dilutes the gastric acidity and makes up for the insufficiency of biliary neutralization.

Accordingly, the painful state encountered in the majority of gastric, duodenal and hepatic affections may be considered as a pain element common to all of these.

What features as well as confuses the symptomatology of the dyspeptic state is, in my opinion, just this twofold mechanical and secretory defense of the stomach which is at the bottom of it.

It gives rise, as above stated, to two distinct types of pain symptoms, the one caused by *aërophagia*, and the second, the result of *prolonged secretion*.

Now, these pains may occur separately or simultaneously, according to the power or powers of defense possessed by the patient.

In the same individual, furthermore, may be seen to intervene the one or the other, or both, of these defensive powers, according to the stage reached by his dyspeptic condition.

At the beginning of the affection, when the mucosa is normal, it is prolonged secretion and its train of painful symptoms which comes into play.

At a more advanced stage, the mucous membrane becomes fatigued, the secretion diminishes, and the defensive *aërophagia* intervenes.

The painful symptoms become modified according as the one or the other of the means of defense make their appearance. Moreover, if there is also taken into consideration the nervous hyperesthesia which in many of these patients increases or modifies all pain, the diversity of the symptomatology of dyspepsia will readily be understood.

Nevertheless, in examining these patients, if the dual process of gastric defense already described is not lost sight of, one can always understand, dissociate and interpret any painful dyspeptic phenomenon.

Further on, we shall see how necessary this interpretation is in applying proper therapeutic directive measures.

MEDICAL TREATMENT OF THE DEFICIENT GASTRIC EVACUATION THAT MAY ATTEND ANY GASTRIC DISTURBANCE.

If the conception of pain that I have outlined is met with in the majority of gastric duodenal and hepatic affections and the pain is dependent upon poor gastric evacuation, how may such evacuation be therapeutically favored?

I have sought the answer to this question in a study of the molecular concentration of the gastric fluid. As is well known, the molecular concentration of a gastric fluid can be clinically determined by estimation of the freezing-point of the fluid, *i.e.*, its cryoscopic index.

Given a normal subject, to whom a meal of bread is given. At the beginning of the digestion of this meal, the gastric contents shows a high molecular concentration, and the cryoscopic reading may be as high as $\Delta = 0.80$.

Then, as digestion proceeds, the concentration becomes lower, showing in succession $\Delta = 0.60$, $\Delta = 0.50$, until finally, at the close of digestion, it tends toward $\Delta = 0.38$.

Let this subject now be given a meal consisting exclusively of meat; in contrast to what took place in the preceding instance, at the beginning of digestion the cryoscopic index is very low, *e.g.*, $\Delta = 0.10$. Then, as digestion proceeds, it rises, becoming, in succession, $\Delta = 0.20$, $\Delta = 0.30$, etc., and tends finally toward $\Delta = 0.38$.

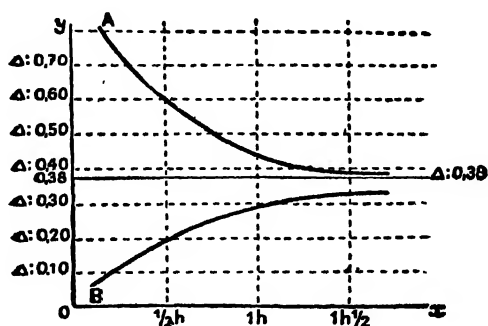


Fig. 314.—Cryoscopic curves after two meals: *A*, a meal of bread; *B*, a meal of meat.

These digestive modifications are represented in the above chart, in which Curve *A* represents the cryoscopic indexes in the course of the digestion of bread, and Curve *B*, those in the digestion of meat (Fig. 314).

In brief, from inspection of this cut one may conclude that the cryoscopic curve of a normal stomach is a curve which varies according to the food ingested, but which shows a tendency toward a common level in the vicinity of $\Delta = 0.38$.

The Cryoscopic Curve after Ingestion of a Medicinal Solution.—Instead of a meal, let the normal subject be given a medicinal solution. Two alternatives are to be considered:

1. *Ingestion of a highly concentrated solution.*—Let the subject be given to drink, for example, a 20 per cent. aqueous solution of sodium chloride. The freezing-point of this solution is $\Delta = 1.24$. As digestion proceeds, the freezing-point becomes lower, showing in succession $\Delta = 1.10$, $\Delta = 1$, $\Delta = 0.90$, and tending finally toward $\Delta = 0.38$.

2. *Ingestion of a very dilute solution.*—On the other hand, let the same subject be given a very dilute solution, *e.g.*, a 0.5 per cent. solution of sodium sulphate, with a freezing-point of $\Delta = 0.09$. In contrast to the preceding test, as digestion proceeds, the freezing-point rises, becoming, in succession, $\Delta = 0.10$, $\Delta = 0.20$, and tending finally toward $\Delta = 0.38$.

These experiments following the ingestion of food or of medicinal solutions show that the stomach, before discharging its contents into the intestine, dilutes it by its secretion in such a manner as to give it, at the close of digestion, a molecular concentration which is always the same.

This molecular concentration corresponds to the cryoscopic index, $\Delta = 0.38$, at which gastroduodenal evacuation appears to occur under the most favorable conditions.

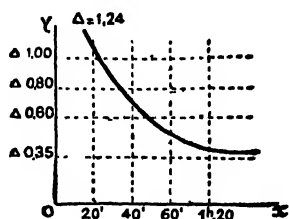


Fig. 315.—Cryoscopic curve following ingestion of a highly concentrated solution.

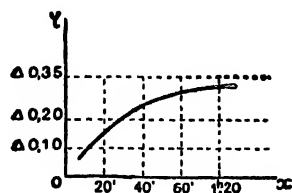


Fig. 316.—Cryoscopic curve following ingestion of a very dilute solution.

Therapeutic Conclusions.—From this cryoscopic study, together with personal clinical observations, two practical conclusions are deduced.

The first is that whenever, at the close of digestion, the gastric contents, for some pathologic reason or other, departs from this cryoscopic index, $\Delta = 0.38$, late pain occurs.

The second is that, to relieve this pain, the therapeutic indication exists to promote gastro-intestinal evacuation by restoring the molecular concentration of the gastric contents to the cryoscopic index, $\Delta = 0.38$.

To procure this result, I can conceive of no more reasonable therapeutic procedure than to dilute the gastric contents, at the time of the pain, with a solution having itself this cryoscopic index.

Following are a few medicinal solutions with a freezing-point approximating $\Delta = 0.38$. I have carried out these investigations, not with pure products, but with specimens of commercial products in current use in the drug shops.

Sodium bicarbonate	0.9	per cent.
Sodium citrate (dried)	2	" "
Sodium sulphate (dried)	1	" "
Sodium phosphate	1.1	" "
Sodium chloride	0.55	" "
Peptone	4	" "
Hydrochloric acid (Codex: 34.4 per cent.)	0.935	" "
Phosphoric acid (Codex: 50 per cent.)	2.68	" "
Lactose	6	" "

The physician has merely to select, from among these solutions, that salt or those salts the action of which seems to him best adapted to the therapeutic end which he is seeking at the same time.

For my part, my selection has been dictated by the following consideration: *Give the patient a solution with a freezing-point, $\Delta = 0.38$, but the neutralizing power of which is as low as possible.*

I am convinced, indeed, after many years' experience, that the worst of treatments is that which aims to modify the secretion, whatever be the drug used—alkaline or acid,—the chief effect of which is an irritant action on the gastric mucosa.

To be sure, if a patient in actual gastric distress is given a spoonful of sodium bicarbonate, immediate relief will be obtained by neutralizing temporarily his gastric acidity. But not only will the patient not be actually improved by this procedure, but by oversaturating the gastric medium, a reactive glandular secretion is induced which will keep up and aggravate the existing lesion.

I am firmly convinced that the majority of the stomach disturbances for which we are consulted are brought on by all the alkaline products poured in through commercial therapeutic channels, with all the greater success because of the fact that they give the patients immediate relief.

As I have already stated, my therapeutic purpose is the opposite of this procedure, and aims to *give a solution with a freezing-point approximating $\Delta = 0.38$ and the action of which on the gastric secretion is almost nil.*

With this end in view, I make extensive use, in prescribing, of lactose, which possesses a high molecular weight and no medicinal effect.

My prescriptions are formulated as follows:

Let it be desired, *e.g.*, to combine lactose, sodium bicarbonate and sodium phosphate in such proportions that 5 grams of this mixture (about one teaspoonful), dissolved in 125 cubic centimeters of water (about one teacupful), will yield a freezing-point of $\Delta = 0.38$.

From the cryoscopic table given above it will be noted that to obtain, with these different salts, a solution showing $\Delta = 0.38$, it is necessary to use, in 1000 cubic centimeters of water, respectively, 60 grams of lactose, 9.5 grams of sodium bicarbonate and 11 grams of sodium phosphate. The following two equations may therefore be expressed:

$$\begin{array}{c} \text{Bicarbonate} + \text{Phosphate} + \text{Lactose} = 5 \text{ grams.} \\ \frac{1000 \times \text{Bicarb.}}{9.5} + \frac{1000 \times \text{Phosph.}}{11} + \frac{1000 \times \text{Lact.}}{60} = 125 \text{ c.c.} \end{array}$$

From these equations, by varying one of the salts, may be obtained a whole series of formulas yielding a solution showing $\Delta = 0.38$, with very different quantities of the drugs.

In the table given below is presented a series of formulas deduced from these equations.

In these formulas, the component substances may vary in dosage, but the entire powder used in the dose of 5 grams to 125 cubic centimeters of water always yields a solution with a freezing-point, $\Delta = 0.38$.

The therapist can therefore obtain solutions having the same evacuant power with salts that he may select qualitatively and quantitatively according to the slight action he wishes to exert on the gastric secretion.

Combinations of sodium bicarbonate, sodium citrate and lactose.

Sod. bicarb. .	16	grams.
Sod. citrate .	4	"
Lactose	180	"
Sod. bicarb. .	13	grams.
Sod. citrate .	12	"
Lactose	175	"
Sod. bicarb. .	10	grams.
Sod. citrate .	20	"
Lactose	170	"
Sod. bicarb. .	7	grams.
Sod. citrate .	28	"
Lactose	165	"

Combinations of sodium bicarbonate, sodium phosphate and lactose.

Sod. bicarb. .	14	grams.
Sod. phosph..	4	"
Lactose	182	"
Sod. bicarb. .	8	grams.
Sod. phosph..	12	"
Lactose	180	"
Sod. bicarb. .	2	grams.
Sod. phosph..	20	"
Lactose	178	"
Sod. bicarb. .	1	gram .
Sod. phosph..	22	grams.
Lactose	177	"

Combinations of sodium phosphate, sodium citrate and lactose.

Sod. phosph..	12	grams.
Sod. citrate .	4	"
Lactose	184	"
Sod. phosph..	8	grams.
Sod. citrate .	12	"
Lactose	180	"
Sod. phosph..	5	grams.
Sod. citrate .	20	"
Lactose	175	"
Sod. phosph..	2	grams.
Sod. citrate .	28	"
Lactose	170	"

[One teaspoonful of each of these formulas, dissolved in 125 cubic centimeters of hot water (one teacupful), yields a solution approximating $\Delta = 0.38$.]

I wish to repeat that with none of the above formulas will an immediate cessation of pain be obtained such as can be produced in some cases simply with a teaspoonful of sodium bicarbonate; on the

other hand, prolonged experience has shown me that by proceeding in this manner there is every chance, not only of not aggravating the secretory disturbances, but of progressively ameliorating the deficient motor function.

In short, whenever there is poor evacuation of the stomach, of whatever cause, it is sufficient to institute a treatment that may be termed the "omnibus" treatment and which consists in the giving, when pain occurs, of solutions of varying saline composition but of unvarying molecular concentration.

THE CHOICE BETWEEN MEDICAL AND SURGICAL TREATMENT.

IMPORTANCE OF OBJECTIVE EXAMINATIONS IN THE CHOICE OF MEDICAL OR SURGICAL TREATMENT IN GASTRIC AFFECTIONS.—While I have sought an "omnibus" treatment of the stomach which is but a symptomatic form of treatment, it is plainly the duty of the practitioner to aim higher. He must above all insist on a causal treatment.

It can be conceded that four-fifths of the patients who apply for relief for a stomach disturbance show no definitely apparent organic lesion, or at least none that is recognized in text-books.

Accordingly, in the presence of a patient complaining of digestive disturbances and exhibiting nervous stigmata, the physician does not hesitate to class the case as one of nervous dyspepsia or gastric neurosis; this means that, blasé as regards this type of patient, he proceeds with the usual palpation of the abdomen merely as a matter of form, without any definite conception as to the information he will derive therefrom.

Not only does one see these practitioners thus limiting their investigation of the gastro-intestinal tract (omitting examinations of the gastric contents and feces, fluoroscopy, etc.), but one meets among them men who very insistently maintain that such investigations are not only useless but also prejudicial to the patient. Such examinations, they say, cause the nervous patient to become imbued with the seriousness of his condition and cannot but increase his suffering and firmly establish his morbid phobia.

I completely dissent from this view, for the following reasons:

The first reason is that I have very often discovered serious lesions of the stomach (ulcers on the lesser curvature, duodenopyloric ulcers, and even hour-glass stomach) in patients considered simply neurotics and subjected exclusively to psychic treatment.

The advice to restrict the examination to verbal inquiry alone, to take into account only subjective evidences and ignore the physical signs inevitably leads to diagnostic error. If, indeed, heterosuggestion is set up by the physician, why should this be more the case with the physical signs than with an inquiry into the subjective manifestations?

I have myself stated elsewhere that very many patients complaining of digestive disturbances have no organic lesions; yet, we should at least be able to pick out from among these supposedly nervous cases those which are actually instances of gastric disease, and it should be borne in mind that any nervous affection may have its exact counterpart in an organic condition.

Another reason, for the medical attendant, is that even when he is dealing with a case amenable solely to psychotherapy, he can exert no real authority or influence on his patient until he has thoroughly convinced himself by all the means at his disposal that there is *no lesion* in the digestive canal under examination.

The last reason is that the nervous patient who firmly believes in the existence of an organic stomach lesion will abandon his phobia only if his mistake is definitely shown to him, and this new conviction can be brought about much more easily by physical facts than by verbal argumentation, however great the authority of the physician in charge.

Physical facts will bring into play a species of logical persuasion, while the spoken word will act mainly through suggestion and, as Bechterew said, suggestion gets into the patient's consciousness by the back stairs, whereas logical persuasion gets into it by the main stairway.

In brief, I believe it necessary to examine every patient complaining of stomach disturbance as if one were dealing with a case of actual disease of the digestive tract.

Assuming that the results of his examination are negative, the physician may then safely and with all of his personal authority apply a course of treatment in which hygienic measures, willing cooperation and the confidence of the patient in his physician will afford the foundation of success.

On the other hand, where the results of his objective examinations are positive, the physician will have to choose between medical and surgical treatment.

MEDICAL OR SURGICAL TREATMENT OF GASTRIC AFFECTIONS.—Before deciding on surgical treatment, one must have at hand data that permit of weighing the risks which the patient is

made to run when he is subjected in vain to prolonged medical treatment, or when he is definitely advised to undergo surgical intervention. The ideal treatment to be recommended is that which is indicated by the algebraic sum of these risks.

To make this differential diagnosis, recourse may be had to the following examinations:

1. Study of the residues of digestion.
2. Test for blood in the gastric contents and in the feces.
3. X-ray examination.

I. Digestive Residue.—Study of the digestive residue affords means of largely solving this question.

This study may be made in the morning on the fasting stomach, after a fast of twelve hours. During the preceding forty-eight hours the patient should be on a milk and vegetable diet, and on the night before the examination, he should have a definite kind of meal.

I advise a meal based on starchy food, as soup or mashed potatoes followed by a few cooked prunes. The skins of these prunes should be swallowed.

Withdrawal of the Digestive Residue.—The residue from gastric digestion being of small volume, can it be easily withdrawn with the tube?

Yes, if the observer guards against making the usual mistake of carrying out the procedure with the patient in the sitting position.

In this position, indeed, the lesser limb of the syphon formed by the rubber tube being vertically placed, the flow in it can be started only by strong contractions of the stomach or the use of one of a variety of aspirating devices, and the withdrawal of the residual fluid is as unpleasant for the patient as it is inadequate for the examiner.

Following is the procedure I follow:

Withdrawal of all gastric contents is done horizontally, with the patient lying in ventral decubitus on a table.

In the first step, with the patient extended but resting on both elbows, passage of the tube is effected with no greater difficulty than in the sitting posture.

In the second step, as soon as the tube enters the stomach the patient is made to lie down flat on the table (Fig. 317). In this posture the lesser limb of the syphon assumes a horizontal position; the flow through it starts of its own accord, and the fluid passes out at once into the glass receptacle.

Further, the pressure of the epigastric region against the table, which may even be increased by making slight pressure with the hand

over the patient's back or by placing a small cushion under the epigastric region, allows of complete withdrawal of the stomach contents.

Quantitative Examination of the Digestive Residue.—By this procedure, with a little practice, the stomach can be emptied almost completely without any exertion on the part of the patient.

It cannot be definitely asserted, however, that the stomach has been entirely emptied, "to dryness."

To secure information on this point and to measure the volume of the stomach contents, one cannot think of employing the dilution

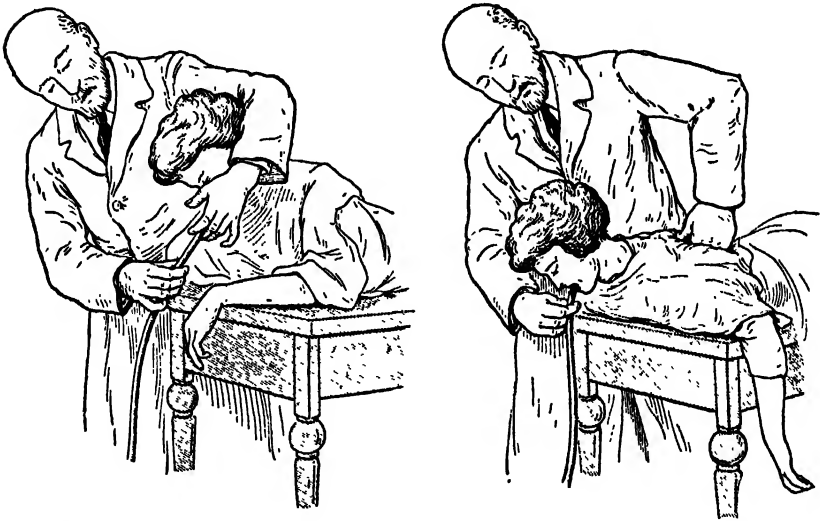


Fig. 317.—Withdrawal of the gastric contents in the horizontal posture.

and acidity procedure of Mathieu and Rémond, as the gastric residue has an acidity that often tends toward zero.

Accordingly, to ascertain this volume, I employ the following indirect procedure:

Before the tube is introduced the patient is given to drink a solution consisting of 2 grams of glucose in 200 cubic centimeters of distilled water.

The tube is next passed in horizontally. The mixture thereupon withdrawn permits of ready calculation of the volume of fluid originally contained in the stomach.

Indeed, the fluid in the stomach dilutes the standard solution of glucose, and the extent of dilution is in proportion to the amount of this fluid.

It is merely necessary for the chemist to titrate with Fehling's solution the solution introduced into the stomach and the solution withdrawn from it and apply the following formula:

$$x = \frac{200 (V-v)}{v}$$

in which V and v refer to the volumes of fluid used to decolorize identical quantities of Fehling's solution introduced.

v refers to the standard solution introduced.

V refers to the solution withdrawn from the stomach.

In the event that the digestive residue still contains food remnants, this determination would be vitiated by the reducing sugars contained in these fluids. It would then be necessary to substitute *saccharose* for the glucose and carry out a double titration of the reducing sugar and the non-reducing sugar—a more complicated procedure.

As will be seen further on, the presence of food in the digestive residue affords surgical indications which eliminate the need for this last procedure, which is thus deprived of its clinical interest.

Clinical Conclusions.—In connection with the fluid thus withdrawn, two possibilities may present themselves:

1. The fluid contains food residue.
2. The fluid does not contain any food residue.

First Alternative.—**The fluid contains food residue.**—A well-known clinical rule applies to this type of finding.

In any patient whose stomach contains a residual fluid showing recognizable food remnants, operation may be considered indicated.

This rule is not sufficient.

It happens rather frequently that a patient in whom the stomach tube is passed several days apart shows at some times stasis and on other occasions an empty stomach: Simple indigestion; temporary retention.

I have seen this happen so often that it seems necessary to emphasize that the introduction of the tube should always be repeated and that, to be of account, the stasis must be a persistent one.

On the other hand, it would be wrong to refer to the surgeon only cases showing a definitely established stasis. In this event, he would be given only lesions so far advanced that the operation would have to be performed under most unsatisfactory conditions.

Any patient showing turbid fluid reacting blue to iodine solution should be kept under observation. Between true stasis and a mere delayed gastric evacuation there is a whole series of different degrees of rétention which one must be able to follow by repeated introduc-

tions of the tube at intervals. The quantitative investigation of the stasis fluids will alone permit of first suspecting, then determining the development of a pyloric stenosis.

Second Alternative.—The fluid does not contain any food residue.—Here again, surgical indications may be estimated on the basis of the following considerations:

VOLUMETRIC DETERMINATION.—Volumetric measurement of the residual fluid appears to me to be of great clinical importance. Whenever this volume exceeds a certain figure—about 100 cubic centimeters—and whenever the volume seems to be progressively increasing on repeated introductions of the tube at intervals, one should beware of a pyloric spasm consequent upon an organic lesion in the vicinity of the pylorus and therefore requiring surgical treatment.

II. Testing for Blood.—Testing for blood may be carried out in the gastric contents and in the feces.

It has real value, however, only if *digested blood* is found, since fresh blood may come from lesions caused by examination (stomach tube) or from the hemorrhoidal lesions.

Gastric Contents.—Given a patient who has been placed on the customary meatless diet.

In the morning before breakfast, the stomach is catheterized; this is done in the *recumbent position*, which allows of evacuation of the gastric contents without any exertion and enables the liquid introduced to come in contact with all the different parts of the gastric surface.

Next, there is introduced through the tube about one glass of distilled water, which is then withdrawn and collected in a glass, *A*.

Through the same tube, left in the stomach, is now introduced a glassful of a 0.5 per cent. ammoniacal solution, *viz.*, 1 cubic centimeter (16 minims) of official ammonia in 200 cubic centimeters ($6\frac{2}{3}$ ounces) of distilled water. This second solution is withdrawn and collected in a glass, *B*.

Tests are made for blood in the two glasses and a comparative test is made of the two solutions by the following procedure:

In a test-tube are placed about 10 drops of Meyer's phenolphthalein reagent and 1 drop of fresh hydrogen peroxide solution. The tube is now inverted so that it contains nothing more than the portions of the reagent adhering to the glass.

To the tube thus prepared is added 1 cubic centimeter of the solution to be examined, and the number of seconds which elapse before the appearance of the red reaction characteristic of the presence of

blood is counted. If the reaction fails to take place after 20 seconds, the result is considered as doubtful.

To make a comparative test of the content of blood in the solutions contained in the glasses, *A* and *B*, one has merely to determine the time which elapses before the appearance of the response under like experimental conditions. The solution containing the most blood is that in which the reaction appears in the lesser number of seconds.

In these tests one of the following three results may be obtained:

1. Glasses *A* and *B* both yield a negative reaction (*no fresh blood, no digested blood*);
2. Glass *A* yields a positive reaction more rapidly than glass *B* (*presence of fresh blood*);
3. Glass *B* yields a quicker reaction than glass *A* (*presence of digested blood*).

Feces.—The feces may contain:

- A. Fresh blood.
- B. Digested blood.
- C. A mixture of fresh blood and digested blood.

A. *Fresh blood.*—The fresh blood occurs in the form of hemoglobin soluble in water.

The feces are then triturated in a mortar with distilled water; after decantation, the filtered liquid is tested with the colored reagent: *Reaction positive.*

B. *Digested blood.*—1. The hematin furnished by this blood is insoluble in water. *Hence, the above reaction is negative.*

2. The feces are now treated with several cubic centimeters of water to which eight to ten drops of ammonia have been added. The hematin dissolves and a *positive color reaction* results.

C. *Mixture of fresh blood and of digested blood.*—1. Feces treated in the mortar with water give a *positive reaction*.

2. The residue of this test, extracted repeatedly with water, gives weaker and weaker color reactions. When this reaction tends toward zero, a last extraction with the ammoniacal water gives, on the contrary, a solution of hematin with a positive reaction.

III. X-ray Examination.—Lastly, to distinguish the medical from the surgical diagnosis, X-ray examination should also be resorted to.

The radiologic study can no longer be restricted to the examination of a single plate.

American investigations, in particular those of C. Cole, have clearly shown that serial radiography alone permits of affirming the presence of a duodenal or gastric lesion.

It is necessary, indeed, to be able to distinguish a contraction visible on but one plate from a deformity which persists on all the plates. Hence the need of taking a certain number of films, to be examined comparatively.

Below will be found some plans of examination which will enable the physician to orient his patient toward a medical or a surgical treatment.

CASE MANAGEMENT BEFORE AND AFTER AN OPERATION ON THE STOMACH.

Before the Operation.—If, before operation, the patient shows phenomena of food stasis, he must be placed pre-operatively on a liquid or semiliquid diet, such as milk, milk foods, or soups. Stomach washings, which tire the patient, must be avoided as much as possible.

Careful examinations of the blood and urine must be made.

The presence of acidosis makes the prognosis of the operation much less favorable. The same applies to renal insufficiency if there is azotemia, if the proportion of urea in the blood is abnormal, exceeding 0.03 to 0.04 gram per 100 c.c.

The fact should, however, always be taken into account that the patients have very often been placed on a diet low in nitrogen.

In order to estimate the kidney function, recourse should be had to the phenolsulphonphthalein test.

Lastly, the surgeon should be given information by all the means at the physician's disposal (clinical, X-ray, and chemical examinations), not only as to the nature of the lesion, but also as to its location and extent.

It should be remembered, indeed, that surgically the nearer the lesion is to the pylorus, the easier the operation.

Special pains should be taken to inform the surgeon as to whether the lesion is extensive or not, in a word, whether he will have enough stomach tissue available to operate.

After the Operation.—The Diet.—During his sojourn in the hospital, the diet of the patient subjected to a stomach operation is the same as that of any operative case.

In gastric medicine, evacuation of the stomach is everything. Consequently, of whatever nature his lesion, if there is a good anastomotic orifice, the patient regains a normal appetite. He quickly forms projects as to his eating which his surgeon does little to discourage, being anxious to confirm his operative success by gastro-nomic successes.

It is upon the attending physician that devolves the thankless task of putting a brake on the diet.

In this connection, the two conditions which the attending physician must bear in mind after the operation are the following: *Is the lesion of ulcerative or cancerous nature?*

If the Lesion is Ulcerative.—In order to prevent to the utmost any relapse, foods which diminish the gastric acidity should be given.

With this object in view the results of Pawlow's experiments should be recalled.

Gastric secretion is abundant with meat, nil with starches, and negative with fats, which slow the secretion.

Consequently, a diet approaching the following type should be advised:

Avoidance of meat for four months after the operation.

Possibility of taking, after leaving the hospital: Vegetables, pastes, and fruit in well divided form, with little seasoning or salt.

Between meals (10 to 4), a glass of milk.

Before the two principal meals, a fatty substance should be taken, preferably in the form of oleate of lime (one tablespoonful of olive oil and of lime water, well beaten together).

After meals, a saccharifying drink (germinated barley water).

With this diet one has the best possible conditions for avoiding all complications, for the five cases of post-operative jejunal ulcer I have seen were in patients who had eaten meat during the second week after operation.

If the Lesion is Cancerous.—It should be recalled that any cancerous lesion indicates a process of invasion of the mucosa with diminution of secretory products.

Therefore, there is no need to reduce the stomach secretion, and from the standpoint of feeding the two following rules should be taken into account:

1. *Spare the gastric musculature.*

The food should be given in finely divided form.

Frequent small meals are indicated (5 meals daily).

As much warmth as possible should be maintained over the region of the stomach.

2. *Keep up the patient's appetite.*

With this object, the food should be varied. In particular, the patient's tastes should be consulted. In these cases more than in any others, one should remember the value of the psychic secretion, and recall, with Brillat-Savarin, that the patient digests properly only that which he has enjoyed eating.

THE PRINCIPAL OPERATIONS ON THE STOMACH.

TREATMENT OF DEFICIENT GASTRIC EVACUATION BY SURGICAL MEANS.—The surgical treatment of gastric disorders, like the medical treatment, is a treatment aiming to combat deficient evacuation of the stomach. The operative procedures in general may be divided into two types:

Gastroenterostomy, which is an operation for drainage leaving the lesion *in situ*.

Pyloro-gastrectomy, which is an operation for drainage aiming in addition to remove the lesion.

Certainly, the indications for these two operations are nearly always settled by the surgeon after opening the abdomen. Nevertheless, it is incumbent on the physician to be familiar with these indications, the main features of operative technic, and in particular, the operative results.

These are the features which will now be considered in reference to each of these two operations.

Indications.—It frequently happens, as already noted, even in the most thoroughly studied gastric case, that upon opening the abdomen a condition is found which compels the surgeon to depart from the procedure which he had *a priori* deemed indicated.

Yet, in a sketchy manner one can get an idea, in the subjoined table, of the standard surgical procedure which corresponds to a definitely determined lesion:

No operation:	<i>All cancers of the body of the stomach with metastases (without pyloric obstruction).</i>
Gastroenterostomy:	<ol style="list-style-type: none"> 1. <i>Duodenal ulcer (with or without pyloric exclusion).</i> 2. <i>Cancer of the pylorus with peritoneal or hepatic metastases.</i> 3. <i>As the first stage in a two-stage gastrectomy.</i>
Pyloro-gastrectomy:	<p><i>All gastric ulcers (with or without gastric, pyloric or bilocular stenosis).</i></p> <p><i>All gastric cancers, whether of the pylorus or not, without metastases.</i></p>

GASTROENTEROSTOMY.

Simple gastroenterostomy is exclusively a palliative operation and, aside from duodenal ulcer, cancerous transformation of which does not occur, it may be said to be a procedure which should ulti-

mately be abandoned when available means of investigation shall have enabled us to make a sufficiently early gastric diagnosis.

Technic.—*The procedure of choice is posterior transmesocolic gastroenterostomy.* The opening in the stomach should be made as near as possible to the pylorus and the greater curvature; the opening in the intestine should be as near as possible to the duodeno-pyloric angle.

Various modes of suspension have been recommended, but these are of relatively slight importance provided the loop is not fixed in a manifestly faulty position.

Favorable Effects of Gastroenterostomy.—Gastroenterostomy exerts an extremely prompt favorable influence on the condition of the patient; the rapidity with which this takes place varies in proportion to the tightness of the preëxisting pyloric stenosis. The pain stops, vomiting disappears, the general condition improves and the patients very quickly gain in weight. This favorable influence is exerted whatever be the cause of the pyloric lesion, including cancer.

Unfavorable Sequelæ of Gastroenterostomy.—*Spontaneous Closure of the Stoma.*—Such closure appears to take place normally (I have been able to observe it fluoroscopically several times) where permeability of the pylorus persists. The peristaltic movements of the normal stomach favor evacuation of the organ through the pylorus, whereas they tend to close the anastomotic opening. Hence the advantage of exclusion of the pylorus in the treatment of duodenal ulcer.

Peptic Ulcer of the Jejunum.—This form of ulcer is generally located in, or in the immediate vicinity of, the anastomotic opening. The ulceration bears a relationship to hyperacidity of the gastric contents, since it is a physiologic fact that the anastomosed loop will withstand the contact of the gastric contents all the less, the farther it is from the duodenum, which plays an alkalinizing rôle.

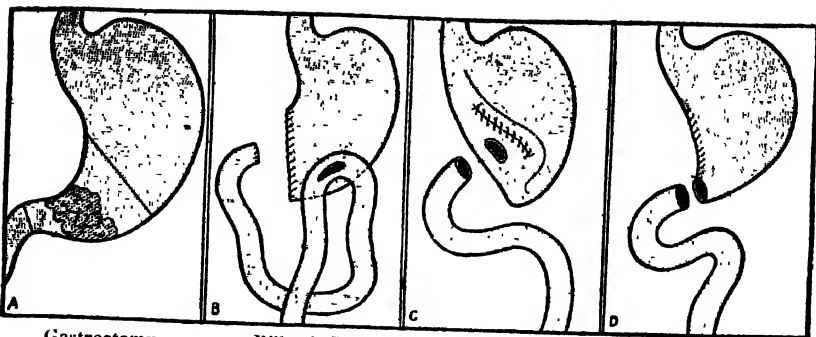
Pancreaticobiliary Backflow.—Such a backflow frequently leads to the entrance into the stomach, after gastroenterostomy, of pancreaticobiliary fluid, which more or less compromises digestion in the stomach.

There has been a tendency to meet this difficulty surgically by performing a complementary operation—jejunojejunostomy.

PYLORO-GASTRECTOMY.

Gastrectomy is tending to become the exclusive operative procedure relating to the stomach; it presents, indeed, the following two advantages:

1. It completely removes the existing lesion, of whatever nature, whether cancerous or subject to cancerous change.

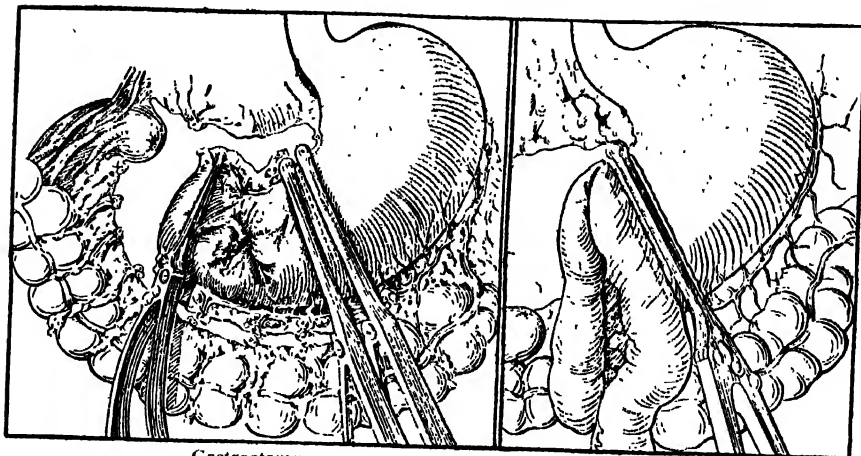


A
Gastrectomy
for Cancer.

B
Billroth II
Method.

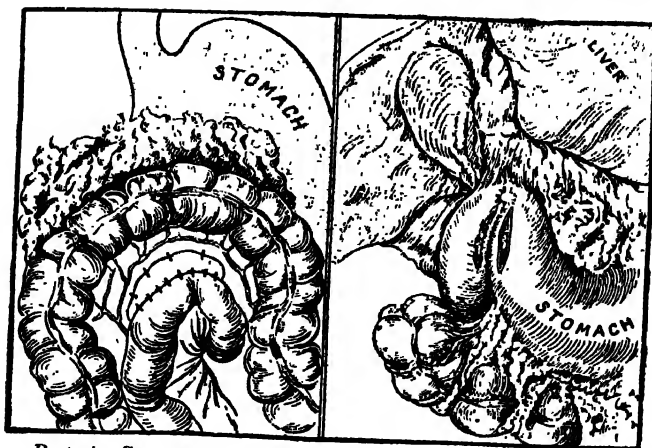
C
Kocher's I
Method.

D
Billroth I
Method.



Gastrectomy.
Removal of a portion of the stomach.
(Halfour.)

Gastrectomy.
Gastrojejunostomy



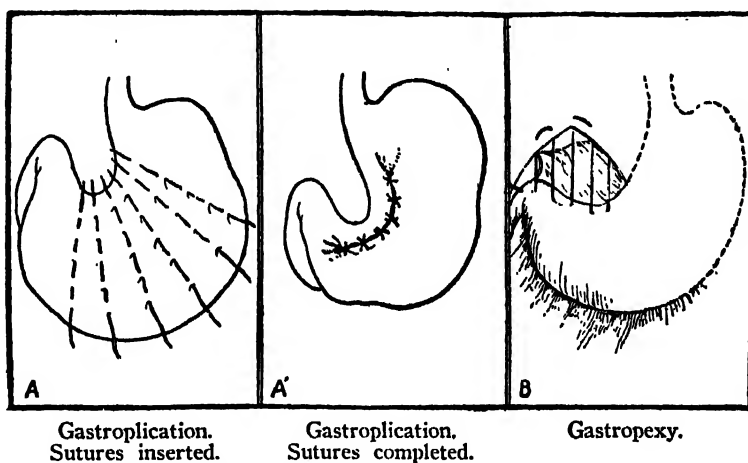
Posterior Gastroenterostomy.

Anterior Gastroduodenostomy.

Figs. 318 to 325.

2. It allows of a restoration of gastroduodenal continuity which approximates the normal condition as closely as possible.

Gastrectomy has for its purpose to remove a portion of the stomach which is the seat of neoplastic or ulcerative lesions; it is nearly always *partial*, and deals mainly with the pyloric region. In the presence of a neoplasm of the pylorus, the excision should be extensive and complete, and the restoration of intestinal continuity is effected by means of a gastroenterostomy after complete closure of the gastric and duodenal incisions; this is the Billroth II method. The Billroth I method consists in making an end-to-end duodeno-gastric anastomosis; but complete absence of leakage is particularly difficult to obtain.



Figs. 326 to 328.—Gastroplication and Gastropexy.

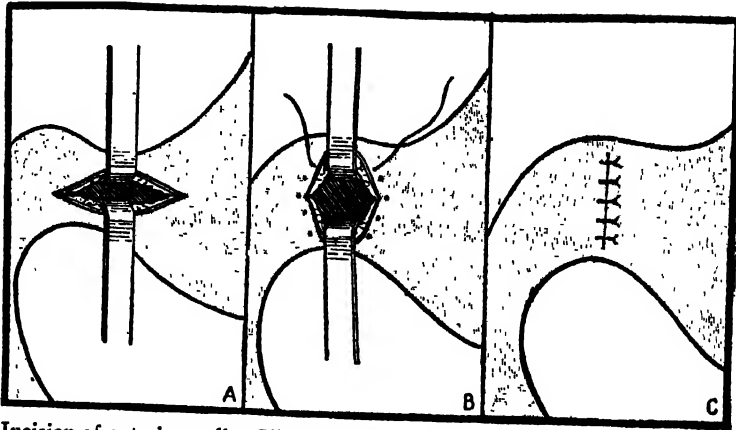
The Kocher method is an end-to-side anastomosis of the duodenum and stomach; it is hard to apply in rather extensive resections. In cases of cancer involving the lesser curvature, an extensive resection should be carried out, followed by closure of the cut end of the duodenum and an antecolic anastomosis of the cut end of the stomach to the side of the jejunum.

OTHER OPERATIONS ON THE STOMACH.

Annular gastrectomy consists in excising a cylindrical portion of stomach tissue involving both aspects of the organ; restoration of continuity is effected by end-to-end anastomosis.

Gastroduodenostomy consists in a lateral anastomosis of the anterior aspect of the duodenum with the corresponding surface of the

stomach. This operation is indicated in cases of ulcer adherent to the pylorus.

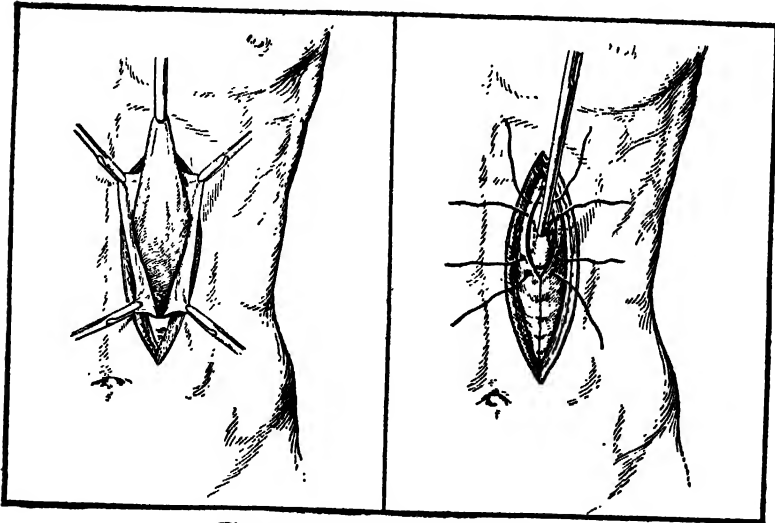


Incision of anterior wall
of the stomach.

Slit drawn out to a
diamond shape.

Suture
completed.

Figs. 329 to 331.—Pyloroplasty.



Figs. 332 and 333.—Gastrostomy.

Gastroplication is an operation which involves an infolding of the stomach wall for the purpose of reducing the size of the organ (in *dilatation*).

Gastropexy consists in fixation of a ptotic stomach.

Pyloroplasty consists in restoring the pylorus contracted by a benign lesion to a size sufficient to allow passage of the food bolus.

Gastrostomy is the making of an opening into the stomach, most frequently on account of cancer or stricture of the esophagus.

TREATMENT OF FUNCTIONAL DISTURBANCES OF THE STOMACH.

I have said that deficient gastric evacuation appears to me to be the basis of the pain, and, as a practical conclusion, have sought an evacuating treatment which could be applied to any stomach condition attended with pain.

In a case of painful stomach condition of long standing, or frequently even chronic, it is necessary, however, to vary the treatment—to have more than one string to one's bow.

Therefore, the physician should modify his treatment according to which of the following functional factors is believed most involved:

Motor factor.

Secretory factor.

Sensory factor.

Psychic factor.

I shall outline, then, the therapeutics of these several factors.

MOTOR FACTOR.—Motor disturbances may be treated:

1. By physical methods.
2. By internal measures.

Physical Measures.—Disturbances of gastric evacuation may, as previously noted, be due to two causes:

1. Obstruction at the pylorus.
2. Insufficiency of muscular contraction.

The first of these conditions is exclusively amenable to surgery.

The second calls particularly for physical measures.

In current text-books these muscular insufficiencies are described at length under the designations, dilatation, atony, ptosis and displacement of the stomach.

Possibly these various muscular lesions can be pathologically defined in this manner; but from the standpoint of treatment, they are all dependent upon a single cause, *viz.*, an insufficiency of the muscle-fibers of the stomach, which insufficiency, furthermore, is almost always associated with weakness of the muscles of the abdominal wall.

It is necessary for the physician, willy-nilly, to combat by all means at his disposal this deficiency, which is the source of a great variety of gastric disturbances.

Let us review the procedures available for combating this muscular insufficiency.

The Corset.—First of all, those influences should be eliminated which are capable of unfavorably affecting the musculature of the stomach, and among these the corset occupies an important place.

Not only does the corset lower the abdominal organs by exerting pressure from above downward, but it forms a rigid, undilatable sheath which maintains in a state of partial immobility all of the lower thorax and a portion of the abdominal wall. It therefore promotes a comparative atrophy of all the muscles concerned in expansion of the chest and contraction of the abdomen.

It is all the more prejudicial from the fact that, aside from the esthetic considerations which women attach to it, they look upon it as an indispensable means of mechanical support. The young girl, readily losing consciousness of the constricting action it exerts, gradually allows structural and atrophic changes in the walls of her stomach to occur.

Hayem summarizes in the following three expressions the varieties of constriction produced by the wearing of the corset:

1. *Suprahepatic variety*: Ptosis and mechanical displacement of the organs.

2. *Hepatic variety*: Constriction of the organs, which are drawn out, elongated and distorted, without necessarily being prolapsed.

3. *Infrahepatic variety*: Chiefly featured by interference with chest expansion.

The occurrence of these several varieties is governed by the varying height of the zone of compression. Well-made corsets have a compression line only 2 or 3 centimeters in height, but poorly made corsets often have a much more extensive compression area. The mixed cases, in which several of the above varieties are combined, are therefore oftenest seen among the lowest laboring classes.

It is important for the physician to be familiar with the misdeeds of the corset, which is the cause of a considerable number of gastric disturbances, and he should not neglect to investigate most carefully to exactly what extent it is responsible for the production of the morbid state consequent upon the deficiency of gastric evacuation to which it gives rise.

The Abdominal Belt.—*A priori*, the abdominal belt should replace the corset. It has for its purpose, indeed, to support the abdominal wall by exerting pressure from below upward, in contrast to the corset pressure, which is exerted from above downward. It should, there-

fore, be of logical and rational assistance in the presence of deficient gastric musculature and evacuation.

The wearing of such supporting belts has, however, to my mind been greatly abused. When one is dealing with an abdominal wall fatigued by numerous pregnancies, by long-standing malnutrition, or simply through the lapse of years, the belt must be recommended to make up for the lack of muscle. But one is constantly seeing abdominal belts prescribed for young subjects complaining of indefinite pains; the tendency to this is all the greater in that the patient is thereby afforded relief—immediate rather than actual. It is quite clear that in a case of muscular atrophy following a fracture of the upper extremity, more relief will be given the patient by keeping his arm in a sling than by mobilizing the limb to useful ends. But should this unphysiologic principle of splinting and immobilization be applied to an abdominal wall that is temporarily in a weakened state?

When the patient has once gotten into the habit of wearing the belt, he will not leave it off; it becomes a necessity to him, and I still recollect the distress of one of these persons obsessed with the supporting belt when, after an abdominal examination, he noticed after leaving that he had forgotten to put it on again.

Again, I deem *unnecessary* the use of a round or crescentic pad or pneumatic support at the lower part of the belt. I admit that for a long time I did use such pads. When they are applied under the fluoroscopic screen, the stomach mass is seen to rise abruptly.

But if one repeats this examination a few hours after the installation of a good belt, which adapts itself well to the abdominal wall, whether it is or is not provided with a suprapubic pad, the stomach will be found under the screen to occupy about the same position.

Indeed, the rubber belt acts in the same way as the elastic portion of the continuous traction devices. By slow, continuous pressure it gradually pushes up the organs just as well as the abrupt, fist-like pressure of the pneumatic pad. Again, I do not believe that the abdominal muscles exert more pressure in the pubic region than they do in the umbilical region; now, the abdominal belt exerts no other endeavor than to replace and imitate, ape-like, this abdominal wall, and, therefore, personally, I recommend to my patients the simple rubber belt, sufficiently broad to extend from the pubis to the umbilicus and fitting perfectly over the parietes so that the hand passed in between the skin and the belt will feel a sufficient and uniform pressure exerted throughout the height of the latter.

Active Movements and Gymnastic Exercises.—There is no doubt that whenever the abdominal wall is insufficient and there seems a possibility of restoring it, active movements constitute the treatment of choice.

This is why gymnastic exercises appear to me to be, above all, the treatment to be recommended. In various sections of this work descriptions will be found of exercises, massage and electric treatment that may be recommended for toning up the abdominal wall. I shall limit myself here to calling attention to a single exercise which has given me much satisfaction in a prolonged experience with it, *viz., walking on all fours.*

Walking on all fours exerts, indeed, a twofold effect on the abdominal wall and on evacuation of the stomach.

1. *On the Abdominal Wall.*—Its efficacy as a means of restoring muscle has been demonstrated, in particular, by repeated tests under the supervision of Lieut. Hébert at Rheims. Men trained by walking on all fours showed a progressive strengthening of their abdominal muscles; this occurs to such an extent that the exercise is a favorite one with boxers who, in order to reduce the probability of a knock-out by a direct blow on the solar plexus, reinforce their abdominal muscular layer in this way.

2. *On Evacuation of the Stomach.*—The effect of walking on all fours on gastric evacuation can be shown both fluoroscopically and chemically.

When a person walks on all fours the spinal column assumes a horizontal position; now, the change from the vertical to the horizontal posture brings about alterations in the shape and location of the stomach which are all the more marked according to the existing degree of gastropotosis.

Evacuation of the stomach, furthermore, is promoted by walking on all fours. Flexion of the thighs on the abdomen is one of the best forms of massage, and in walking on all fours, since such flexion of the thighs occurs to its fullest extent, it should result in evacuation of the stomach as effectively as possible.

That this is the case I was able to determine by removing test meals in an individual who, during certain intervals, had or had not walked on all fours. Study of the transit of food through the stomach shows that, with the same meal, evacuation gains about 30 per cent. as a result of walking on all fours.

In short, this exercise, by combining the horizontal posture with agitation of the stomach region, seems to exert a distinct effect on gastric evacuation.

These experiments would appear to confirm the theory of Darwin, describing the primitive human beings as quadrupeds, who gradually become bipeds in order to make use of their hands, which, through their relationship to the mind, were to insure for man domination of the world. In this process of evolution, however, have the location and function of the stomach become sufficiently adapted to the new conditions? It seems permissible to believe that they have not, since experiments show that evacuation of the stomach is much more rapid in the quadrupedal position than in that of the biped.

Following are the forms in which I recommend this exercise in the treatment of gastric conditions:

1. In the form of a prolonged gymnastic exercise, if the patient is young and able to build up his muscular wall again.

2. In the form of an exercise for a few minutes in the morning before breakfast but after drinking some hot liquid, if the aim is merely to carry out a species of physiologic auto-cleansing of the stomach.

Chilaiditi's Method.—To assist gastric evacuation there is also the possibility of employing the respiratory exercises recommended by Chilaiditi in X-ray examinations: *Following a deep expiration, the patient breathes in with the chest, the mouth and nose being closed. The inspiration is carried out while "hollowing out" the abdomen as much as possible*

This maneuver may take the place of the movements already described.

Internal Treatment.—In the whole of the first part of this work it was my aim to deduce formulæ of solutions with a cryoscopic index $\Delta = 0.38$, calculated to favor gastric evacuation.

I am giving here besides a number of preparations which will enable the practitioner to vary his treatment.

1. Certain vegetable preparations have an effect on gastric motility, *viz.*, the bitters, which also act on the secretion (gustatory secretion).

Let us note amongst these vegetable preparations ipecac and strychnine. The former may be prescribed as the tincture of ipecacuanha in ascending doses, increased daily from 2 drops up to 15 or 20 drops; the drug is later stopped to prevent tolerance, then resumed.

Strychnine sulphate may be given in a solution of 0.05 Gm. ($\frac{3}{4}$ grain) in 150 c.c. (5 fluidounces) of water in teaspoonful doses before meals.

Carbonic Acid.—Already in 1906 I drew attention to the part played by carbonic acid in gastric evacuation.

In a study of the measurement of the gastroduodenal flow, I was able to ascertain that certain medicaments based on nascent carbonic acid may increase this flow by 10 to 20 per cent.

Furthermore, carbonic acid, by increasing the air bubble, creates an artificial *aërophagia* and thereby increases the evacuatory action of the normal *aërophagia*.

In 1922, Carnot and Karnowski, in dogs with duodenal fistulæ, came to the same conclusion upon introduction of carbon dioxide into the stomach.

In practice, I use the following formula:

Paper No. 1:	Powdered tartaric acid	.....	1	gram (gr. xv);
Paper No. 2	{ Sodium bicarbonate	.....	0.4	gram (gr. vj);
	{ Carbonate of lime	.....	0.3	gram (gr. ivss);
	{ Magnesium carbonate	.....	0.2	gram (gr. iij).

I recommend that these papers be used as follows: Dissolve separately in two half-glassfuls of water one paper No. 1 and one paper No. 2. Take in succession one tablespoonful of No. 1 and of No. 2. Continue thus every ten minutes until the pain stops.

Thermal Waters.—I have shown that any solution whose freezing-point tends toward $\Delta = 0.38$ favors to the utmost the gastro-duodenal flow.

What I have said of drug solutions applies also to thermal waters. The waters which approach this concentration appear to me those best suited for the treatment of gastric disorders.

Following are a few figures as to freezing-points of thermal waters below 0:

Evian $\Delta = 0.02$	Marienbad $\Delta = 0.36$
Vittel (Grande Source) $\Delta = 0.03$	Châtel-Guyon $\Delta = 0.33$
Contrexéville $\Delta = 0.05$	Vichy Hôpital $\Delta = 0.39$
Plombières $\Delta = 0.10$	Vichy Grande-Grille $\Delta = 0.40$
Pougues $\Delta = 0.17$	Vichy Chomel $\Delta = 0.38$
Vichy Célestins $\Delta = 0.23$	Saint-Nectaire $\Delta = 0.39$
Vals Favorite $\Delta = 0.27$	Montmirail $\Delta = 0.73$
La Bourboule $\Delta = 0.31$	Rubinat $\Delta = 1.30$
Carlsbad (Sprudel) $\Delta = 0.30$	Carabana $\Delta = 1.45$

From the above we may conclude that the waters of the Vichy *Chomel* spring are the thermal waters exerting the most action on the transit through the stomach.

SECRETORY FACTOR.—Gastric Secretion.—Its Treatment.—

This section is written particularly as a protest against the usual form of treatment, which makes gastric secretion the pivotal point in the therapeutics of gastric disorders.

Gastric Hypersecretion.—Hypersecretion especially is the *bête noire* against which are directed all the resources of official and commercial

therapeutics. The commercial products, all based on alkalies in massive dosage, are continuing and will further continue to combat hypersecretion, with rewards that will be exclusively pecuniary.

I have already stated why I consider such treatment most harmful.

Indeed, increased gastric secretion is not a morbid state: There may be gastric secretion above the average, just as there may be a well-developed musculature.

Hypersecretion becomes pathologic and painful only under two conditions:

1. Where it is the result of a deficient gastric evacuation, ranging from simple muscular atony to pyloric stenosis.
2. Where it accompanies a lesion of the mucous membrane ranging from a simple erosion to an established ulcer.

To combat hypersecretion by chemically neutralizing the hydrochloric acid is harmful treatment, since it is well known that alkalies provoke a defensive reaction which increases the activity of the glands.

Hence, treatment logically directed against hypersecretion which is causing pain should have two objects in view:

1. To favor the evacuation of the stomach, which is the source of the hypersecretion, by medical or surgical means.
2. To guard the mucous membrane from the corrosive action of the gastric juice by protective substances, as described in the next section (*Sensory Factor*).

Aside from these two proceedings the physician has at his disposal, by way of rational treatment, only adjustment of the diet.

To shorten the stay of the food in the stomach there is advantage in ordering liquid or semi-liquid foods: Milk, milk products, purées, pastes, etc., or foods which, by reason of their low content of nitrogenous components, will fail to excite secretion of hydrochloric acid and pepsin (starches, fats, etc.).

Lastly and in particular, it is important to give fatty foods.

Fat inhibits the secretory function, according to Pawlow, either in a purely mechanical manner, sealing off, as it were, the mucous membrane of the stomach and preventing the chemical food stimulation of the nerve endings, or in a reflex manner, by inhibiting the center of the secretory nerves.

Fats may be given at the beginning of the meal: Butter, oil, sardines in oil, etc.

Given below is a second procedure which I use routinely in cases where the delayed pain appears to be related to small stomach ulcerations associated with marked gastric hypersecretion.

In the morning, on the fasting stomach, I inject through the stomach-tube into the stomach $\frac{1}{2}$ to $\frac{3}{4}$ liter (1 to $1\frac{1}{2}$ pints) of a mixture of oil and lime water in equal parts. The patient retains this mixture for one-half to one hour, rolling his body over and over during this period.

At the expiration of one hour, the residue of the stomach contents can be withdrawn in the event of diarrhea following this treatment. At the end of about ten days of these oil treatments, the late pain accompanying this condition is frequently observed to cease.

I give below several formulæ for neutralizing powders which may be used at the time of the pain.

I give these because, I repeat, the patient must have at his disposal a choice of therapeutic measures, emphasizing, however, that such procedures, constituting a double-edged sword, should be used only as a last resource.

These powders should be given only at the time of the pain, preferably dissolved in a wineglassful of warm water.

1. Powder containing a soluble component :

℞ Calcii carbonatis præcipitati,
Sodii bicarbonatisāā 1.5 grams (gr. xxij).
Pone in chart. No. i.

2. Powder containing no soluble component :

℞ Calcii carbonatis præcipitati 2 grams (gr. xxx);
Magnesii oxidi 1.5 grams (gr. xxij).
Pone in chart. No. i.

3. Powder containing one inert, non-alkaline component :

℞ Calcii carbonatis præcipitati 1.5 grams (gr. xxij);
Kaolini 3 grams (gr. xlv).
Pone in chart. No. i.

Gastric Hyposecretion.—Just as treatment directed chemically against the excess of acid has a very restricted rôle, so the medicinal resources in the presence of insufficiency of hydrochloric acid and pepsin are likewise very limited.

The doses of acid that can be used are relatively small. The hydrochloric lemonade of the French Codex, for example, contains but 2 per cent. of dilute hydrochloric acid, *i.e.*, 0.2 per cent. of the pure acid.

Such doses, taken in the course of a meal, do not materially change the acid content of an alimentary medium in the stomach.

As for pepsin, on the other hand, only traces of it are required to insure gastric digestion.

The only rational and scientific therapeutic procedure that can be applied in a case of hyposecretion is one deduced from the following experiments of Pawlow:

Given a dog operated by Pawlow's technic: The dog has an ordinary gastric fistula, provided with a metallic cannula; the animal has, in addition, undergone esophagotomy, so that his oral cavity is completely shut off from the stomach.

Not a drop of fluid is flowing from the gastric fistula. The dog is now given food. The animal eats ravenously, and all the meat ingested comes out again from the upper cut end of the esophagus. A few minutes after this fictitious meal, pure gastric juice appears at the orifice of the gastric fistula, and this secretion continues throughout the duration of the fictitious meal.

The conclusion reached from this experiment is as follows: *Gastric secretion is dependent upon the sense of taste.* It may be brought on or considerably augmented by stimulation of the gustatory sensation. Thereupon there reappears, in a prominent place, the whole system of treatment by the stomachics and bitter tonics, which had gradually receded into empiric medicine.

In all patients with insufficient secretion, whether this be the result of pathologic impairment of the glands or merely a nervous functional disturbance, there is advantage in making use of the time-honored series of stomachics, some of which are mentioned below:

1. *The alkalis:* One wineglassful (70 c.c.—2½ ounces) of Vichy water ten minutes before meals.

2. *The true bitters:* The old pharmacopeias devoted a large section to the bitter preparations, but modern medicine, with its tendency toward specific medication, has rejected these formulæ as savoring of empiricism.

The experiments of Pawlow, however, are rehabilitating these formulæ through physiologic conclusions which serve as a guide in modern gastric therapeutics.

From the experiments on esophagotomized dogs that I have already recalled, the following pertinent conclusions may be drawn:

Digestion parallels the sensation of taste. This sensation lets loose the psychic stomach secretion which is the basis of gastric digestion.

The therapeutics of the bitters should therefore be reconsidered; it consists in finding preparations fulfilling the following threefold object:

1. *To excite to the utmost the buccal papillæ.*
2. *To excite them in an agreeable way, so as to conform to the principles of the physiology of taste.*

3. Not to act deleteriously on gastric secretion.

This therapeutic problem may, to my mind, be solved as follows:

1. BITTER PREPARATIONS TO BE REJECTED.—These comprise all those preparations of the old pharmacopeias which are prescribed in such a form that they are swallowed without actually coming into contact with the buccal papillæ, *e.g.*, the cachets or capsules of powdered gentian, calumba, or nux vomica.

The pills, as of aloe, cinchona, pills *ante cibum*, etc.

2. BITTER PREPARATIONS TO BE USED IN MODERATION.—These comprise all the commercial appetizers based on alcohol.

They are, indeed, a double-edged weapon; promoting appetite by their bitters, but deleterious through the alcohol which destroys the gastric ferments. Nevertheless, those with but little alcohol may be used.

For example:

Wine.

℞ Cacao	50 grams (℥iiss);
Cinchonæ	25 grams (℥vj);
Aurantii amari corticis	15 grams (℥ss);
Alcoholis (60%)	80 grams (℥iij);
Vini albi	1 liter (Oij).

To be macerated for a week. One liqueur glass at a dose.

Or, again:

Drops.

℞ Tincturæ gentianæ	7 c.c. (℥cx);
Tincturæ anisi,	
Tincturæ limonis	āā 10 c.c. (℥iiss).

Twenty to fifty drops in a wineglassful of sweetened water.

3. BITTERS TO WHICH PREFERENCE SHOULD BE GIVEN.—(a) *Aqueous preparations.*

Example:

℞ Gentianæ,	
Aurantii amari corticis,	
Centaurii (N. F.)	āā 20 grams (℥v);
Sodii carbonatis	10 grams (℥iiss).

The above is to be macerated for three days in 1 liter of cinnamon water. The dose is one teaspoonful in a glass of water, plain or sweetened with sugar.

(b) *Preparations of the chewing-gum type*, which act on the buccal papillæ for as long a period as possible.

In this connection, one may use in the following formula as excipient gum chicle, which in the United States forms the basis of chewing gum:

Powdered gentian	0.3 gram (gr. v);
Sugar	4 grams (℥j);
Gum chicle	12 grams (℥iij);
Ammoniated glycyrrhizin	enough to flavor.

With this a mass is made in a heated mortar and divided into small pieces of gum. The gum is to be chewed five to ten minutes before each meal.

Lastly, it is in this group of patients that the physician should not make use of "ready-made" diets. He should remember, as applying particularly to these cases, that gastric secretion occurs in conjunction with taste sensation, and, as Brillat-Savarin advised, should follow the gastronomic precept that *a person digests well only what he has eaten with a good appetite.*

SENSORY FACTOR.—Sensitiveness of the Stomach.—Its Treatment.—Sensitiveness of the gastric mucous membrane may become pathologic in the case of a simple gastric hyperesthesia more or less closely bound up with a condition of general hyperesthesia or in the presence of a lesion of the stomach associated with a solution of continuity of the mucous membrane (ulceration, ulcer, cancer).

How can this painful sensitiveness be overcome? In the average formulary are mentioned many analgesic preparations, such as solutions of cocaine, chloroform and menthol. After having tried them all, I have discarded them.

I employ two measures for reducing gastric sensitiveness:

1. Heat.
2. Formation of a protective layer.

Heat.—It seems unnecessary to recall the sedative effect of heat applied over the stomach. Every patient uses this measure of his own accord. The ordinary hot-water bag or hot, moist compresses may be recommended. In my practice I often make use of a small warming device commercially known as the Japanese stove. This device is advantageous in that it may be carried upright in a small flannel sac suspended from the neck. It allows the patient after each meal to maintain a constant warmth over the stomach region for several hours, while remaining free to go about his business as usual.

Formation of a Protective Layer.—It is a common practice in the treatment of gastric affections to use for this purpose a suspension of bismuth subnitrate or subcarbonate.

For a number of years I have been substituting for the bismuth powdered kaolin, which I prescribe in the following way: Washed powdered kaolin, 20 grams (5 drams); to be moistened with 100 cubic centimeters ($3\frac{1}{3}$ fluidounces) of boiled water so as to obtain a suspension having the consistency of cream. This is to be taken in the morning on an empty stomach.

Or, better: A powder containing 20 grams (5 drams) of kaolin and 5 grams (75 grains) of agar. This is boiled for fifteen minutes in 150 cubic centimeters (one teacupful) of water, strained and drunk as hot as possible. *At 60° C. (140° F.) this decoction is a liquid; in cooling to*

the body temperature it solidifies and forms a solid, strong coating over the inner surface of the stomach.

Bismuth and kaolin have no chemical action on the gastric secretion. Their therapeutic effect can be explained only by their adhesion to the mucosa, over which they thus form a protective layer.

This adhesive property is extremely pronounced in kaolin or China-clay, a greasy clay, the cohesion of the constituent particles of which permits of its being kneaded and forms the basis of its industrial uses.

Aside from this striking advantage, kaolin also presents the following other advantages over bismuth:

By reason of its chemical permanence, it does not change the color of the patient's stools and allows the patient to detect an intestinal hemorrhage, whereas bismuth, by reason of its chemical conversion in the intestine into the black sulphide of bismuth, masks chemically all evidences of melena.

Further, since kaolin is of practically no pecuniary value, whereas bismuth is costly, the coating of the stomach with kaolin can be repeated for an indefinite time by a class of patients whose only wealth consists in the wealth of their gastric secretion in hydrochloric acid.

Finally, kaolin may be said to have over bismuth the advantage of a long-standing recognition, for while I have been recommending it only since 1910, I am not the first one to have used it, as is shown by the following curious observation made by Jean Scultet in 1622:

A Cured Erosion of the Stomach.—"In the year 1622 I opened the cadaver of a monk of Padua (who was said to have died of colicky pain) and in seeking the cause of his death I found the fundus of the stomach not only affected with inflammation, but also corroded down to its middle layer. The excellent Spigelius says that to cure such an inflammation and erosion of the stomach there is nothing so effective as marked earth ('terre sigillée') taken by the mouth because, adhering strongly, by reason of its viscosity, to the corroded layers of the stomach, it dries up these erosions no less than does 'diachalceteos cerate' applied to an inflamed foot. I have since then seen with much admiration the importance of this advice on two separate occasions on which the stomach was suffering very great pains, caused by erosion, which one had not been able to allay, either by remedies taken by the mouth or by their application, except by bringing into use the 'terre sigillée' dissolved with syrup of comfrey."

Now, the *terre sigillée* referred to is none other than *powdered kaolin*, used in suspension in syrup of comfrey (*Symphytum officinale*).

Bismuth Salts.—The salts of bismuth fulfill the same object.

They are prescribed either as the subnitrate or, preferably, as the *subcarbonate*, which is less toxic.

This last is employed in two ways:

1. In small doses (1 to 3 grams—15 to 45 grains) taken after meals in a little water.

2. In a massive dose: 20 grams (5 drams) to be taken at one dose in the morning on an empty stomach, suspended in enough water to give the preparation a creamy appearance.

This course of treatment is continued for 15 to 20 days.

TREATMENT OF ORGANIC LESIONS. GASTRO-DUODENAL ULCERS.

From the therapeutic standpoint, here alone of interest, ulcerations of the stomach and of the duodenum may be described in the same section.

Whether one is dealing with the classic ulcer of Cruveilhier, with ulcerations of the body of the stomach, more deeply hidden but more frequent, whether they be specific or not, or with pre-pyloric ulcerations (on the duodenal or the gastric side), or with true duodenal ulcer, there is met with the same pain symptomatology, of which the type is the tardy pain.

As already stated, in my opinion, the pathogenesis of the pain in all these cases is the same. It is due to the chemical secretion, resulting from the contact of the food mass with the bared nerve terminals. This qualitative contact entails a change in the secretion which upsets the normal laws of pyloric control and induces in all these cases a painful spasm of the pylorus.

The pain symptomatology having a uniform pathogenesis, one may deduce a scheme of treatment which will answer in all gastro-pyloro-duodenal ulcerations.

It will devolve on the physician, however, to *locate the ulceration*, on the one hand, and on the other, to inquire whether *there is not an underlying syphilitic soil*, with the twofold purpose of being able to decide on a surgical diagnosis or to institute specific treatment.

To locate a gastric ulceration, I carry out the investigations described in the section beginning on p. 1401, and of which I shall recall in the space of a few lines the only procedures which I use in practice.

1. Determination of the residual fluid (glucose procedure) (p. 1403).

If this fluid exceeds 100 to 200 cubic centimeters, a pre-pyloric ulcer should be suspected.

2. Test for hematin (ammonia procedure).

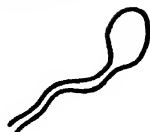
3. Serial X-ray examinations.

Let it be borne in mind that any radiographic study of the stomach and duodenum *must be serial*. Repeated presence of the deformities can alone justify a diagnosis of a lesion, whether affecting the stomach or the duodenum.

CANCER OF THE STOMACH.



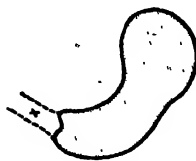
Cancer of the body of the stomach
(lacunar contour).



Diffuse cancer (linitis plastica).



Hourglass stomach (narrowing of middle of stomach due to cancer or fibrous tissue).



Amputation of the pyloric region (cancer of the pylorus).

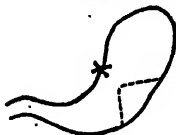
ULCER.

Symmetric Deformity of the Stomach and Duodenal Ampulla.

STOMACH.



Straightening or retraction of the lesser curvature (dotted line).



Filling defect (dotted line); involves the curvature opposite the ulcer.

AMPULLA.



Niche.



PERIDUODENITIS.



Deformity of the ampulla, but with variation of the deformity in serial radiograms.

The X-ray deformities in gastric and in duodenal ulcer are, indeed, truly counterparts of one another, and may be summed up in the three following types:

The niche.

Retraction of the wall.

The incisura.

(See radiograms, p. 1427).

From the standpoint of therapeutic deductions, an ulceration must, furthermore, be differentiated from periduodenitis.

In the latter event, there are found deformities due to the fact, that the duodenum is hemmed in by adhesive strands of varying extensibility. Characteristic of these deformities is that *they are not constant* in serial radiograms.

A gastroduodenal ulceration, wherever situated, presents itself to the physician from the therapeutic standpoint in three stages:

A. In the stage of complications (hemorrhage, perforation).

B. In the painful stage.

C. In the interval between painful stages.

For practical purposes these three stages accordingly require consideration from the standpoint of treatment.

A. STAGE OF HEMORRHAGIC COMPLICATIONS.—Only the hemorrhagic complication will here be referred to, *perforation being exclusively a surgical emergency*, the practitioner almost certainly saving his patient's life if he refers him to the surgeon before the twelfth hour.

Following are the guiding principles relative to treatment when hemorrhage is encountered.

What Not to Do (see *Hematemesis*).

What to Do.—The patient must be put at rest at once; he must remain recumbent and avoid moving and talking.

Rest should be pushed further by immobilizing to the utmost the visceral organs (0.02 gram— $\frac{1}{3}$ grain—of morphine in three or four divided injections in the twenty-four hours). If the hemorrhage is copious, all oral ingestion of fluid should be replaced by small doses of glucose solution (50 to 100 c.c.— $1\frac{2}{3}$ to $3\frac{1}{3}$ fluidounces) given in repeated subcutaneous injections or by a drip enema of glucose solution (500 to 1000 c.c.—1 to 2 pints—in the twenty-four hours).

If syphilis is suspected, specific treatment by rectum should be promptly instituted. Thus, the following suppositories, to be used every night, may be ordered:

℞ Unguenti hydrargyri fortioris 0.05 gram (gr. $\frac{3}{4}$);
 Olei theobromatis 3 grams (gr. xlv).
 Fiat suppos. No. i. Da tal. No. x.
 Sig.: One suppository to be inserted nightly on retiring.

The mouth and teeth should be duly cared for. The suppositories should be stopped in the event of diarrhea.

Rest of the Stomach.—The stomach must likewise be given rest from the digestive process.

Nevertheless, it must be kept in mind that *inadequate feeding of the patient is unfavorable to healing of the ulcer.*

Following is a scheme of progressive diet which I apply in the average case:

- 1st and 2d days ..*No food whatever.*
 3d dayOne-half liter (1 pint) of milk in the 24 hours, or condensed milk (one tablespoonful) every 2 hours, representing about $\frac{1}{2}$ liter of milk.
 4th dayOne liter (quart) of milk in the 24 hours or condensed milk (one tablespoonful hourly).
 5th dayOne and one-half liters (quarts) of milk in the 24 hours or 2 tablespoonfuls of condensed milk hourly.
 6th and 7th days ..Two to three liters of milk.

If condensed milk is given, water must be supplied by means of small 10 per cent. glucose enemas or by drip glucose enemas ($1\frac{1}{2}$ liters of water per 24 hours).

A sufficient amount of food is thus soon reached, and the hydrochloric acid secretion is hindered by the fatty materials contained in the condensed milk. The latter presents, moreover, the advantage of affording the patient food in small bulk and eliminating the water of the milk, which excites gastric secretion (Pawlow).

Beginning with the eighth day, the patient receives starchy soups, then purées, care being taken to have him ingest milk every two hours between meals.

When the least sensation of pain appears, the pain-producing secretion is to be neutralized with an insoluble powder:

℞ Calcii carbonatis præcipitati,
 Magnesii oxidiāā partes æquales.

A knifepointful of this powder is taken mixed in a wineglassful of water. The patient drinks this in small mouthfuls every two or three minutes until the pain stops.

Sippy's Treatment.—In either gastric hemorrhage or progressive gastroduodenal ulcer, Sippy applies a treatment now much in vogue

in America and which is based on constant neutralization of the gastric contents by frequent meals, the repeated use of alkalies, and aspiration of the secretions.

He attains this object by keeping the patient in bed and giving hourly a small meal of milk, and half-way between these meals, one of the following powders in a half-glassful of water:

- (1) \mathcal{R} Magnesii oxidi ponderosi,
Sodii bicarbonatis 0.5 gram (gr. viiss);
- (2) \mathcal{R} Calcii carbonatis præcipitati 0.5 gram (gr. viiss);
Sodii bicarbonatis 1.5 grams (gr. xxiii).

At the close of the day Sippy withdraws with a small Rehfuß tube the secretion contained in the stomach cavity, so as to spare the progressive ulcer the peptic action of the gastric secretions.

Einhorn's Treatment.—Lastly, mention must be made of the method of feeding through a duodenal tube, recommended by Einhorn on the basis of an imposing series of 315 ulcer cases thus treated.

I have personally applied his procedure, but have often been foiled in it by intolerance on the part of the patient. However, the method is as follows:

To insure complete rest of the stomach, Einhorn passes his tube (See Fig. 212) into the duodenum and leaves it in.

Food has to be given warm and in small quantities. The schedule of the meals is laid down by Einhorn thus: He gives every two hours 200 grams of milk sweetened with sugar and in which is mixed one egg-yolk. Other foods may be given, such as maltose gruels, oat meal, rice, potato starch, fruit juices and meat juice. The essential point is that these foods shall be sufficiently fluid, well strained, and contain no flakes that might obstruct the tube. If they do not wholly meet these requirements, it is easy to filter them through some fine material.

In the intervals between meals, there may be administered by the duodenal route in one or divided amounts a certain quantity of physiologic salt solution, 300 to 500 cubic centimeters (10 fluidounces to 1 pint) on an average. One should not forget to wash out the mouth to obviate fermentative processes therein, nor to watch the intestine and empty it, if necessary, with enemas.

In general, duodenal feeding is easily carried out. The patient is kept in bed for the first week. He is then very gradually authorized to get up. The tube, which is very well borne, may be left in for two to three weeks, which suffices, in the majority of cases, to complete the gastric rest cure which is the object of this method of feeding.

B. PERIODS OF PAIN ATTACKS.—During the periods of pain, the treatment likewise calls for general rest and rest of the stomach.

In the event of major pain attacks, the patient should be made to rest in bed for fifteen to twenty days, heat applied over the stomach region (hot water bag or hot compresses), and the feeding consist of milk or soups given every three hours.

This treatment has the added advantage for the practitioner of giving diagnostic information. It allows, indeed, of differentiating between an ulcerative disorder amenable to medical treatment and a gall-bladder or organic disorder calling for surgical intervention.

In the first instance, rest in bed rapidly brings about alleviation of the pain; *in the second, if the pain persists, one is authorized in calling in the surgeon to look for the lesion in the region of the liver, gall-bladder, duodenum and pylorus.*

In the way of treatment calculated to protect the mucous membrane, the following procedures may be employed:

Protective layer of kaolin (p. 1424).

Protective layer of bismuth (p. 1425).

Oil treatment (p. 1421).

C. TREATMENT IN THE INTERVALS BETWEEN PAIN ATTACKS.—The rôle to be played by the attending physician is to place his patient on a diet and decide on operative treatment, when indicated.

Let us examine these two aspects of the problem.

Medical Treatment.—Suppose medical treatment is to be attempted in a patient with gastric ulcer in the period of quiescence. What measures are available?

Diet.—I have already said that an ulcer of the stomach may run a twenty or thirty years' course. This means that one cannot impose a milk diet on a patient for an indefinite time.

What is the ideal diet?

We know from physiology, and we know from the labors of Pawlow which serve as the scientific foundation for dietetic treatments, that the protein foods, which have the power to call forth a copious gustatory secretion, are all to be excluded from the diet, since they excite the secretion of gastric juice, some chemically, others through psychic action. Hence the necessity of reducing meats and fish, of interdicting spices and pungent articles stimulating the appetite, and of increasing the number of meals, in order to reduce the appetite as much as possible.

A standard dietary should be one comprising frequent meals: 7 and 10 a.m., noon, 4 and 7 p.m. The larger meals should be made up mainly of vegetables, starches, pastes, eggs, butter and cream. If meat is added, it should be taken as a second course, never at the beginning of the meals, since hypersecretion, which is common in these patients, antagonizes the digestion of starches. There is therefore advantage in starting with the foods which are digested simply under the influence of the salivary enzyme.

The question may be asked, whether any contact of food is not capable of bringing on gastric secretion. It is not; one has merely to recall the classic experiment of Pawlow who, in a dog with a gastric fistula, was unable to excite any gastric secretion by drawing a feather or glass rod over the mucous membrane of the stomach.

The inhibiting action of fats on secretion should be kept in mind. The following illustration will suffice as proof of this fact. I saw on one occasion a patient suffering from established gastric ulcer. He was a man of about sixty years who had had his first hemorrhage at the age of thirty; this had been followed by a number of others at very irregular intervals. This intelligent man, who was at the head of a large industrial establishment, gave me the following account of his case: "In the last thirty years I have consulted many physicians in Paris, elsewhere in France, and in other countries. Needless to say, I was ordered numerous diets, all of which I followed to the letter. Well, I had to give them all up, and I am now on a diet based merely on a chance observation of mine.

"One day, while out hunting, I had to lunch with a poor farmer and took a meal consisting solely of fat bacon. I was in the midst of an acute attack of pain at the time. To my great surprise, I had no more pain the whole day. Since then I have not only taken this food again, but adopted it for continuous use. With the sweet cream of Normandy, it makes up almost the whole of my meals. When I stick to it, my pain is almost *nil*. As I am very fond of good things, however, I sometimes depart from this diet, but the pain drives me back to it."

Evacuant Treatment.—It is very necessary not to leave food in contact with the stomach too long. The food should therefore be given in a state of extreme subdivision, and the patient urged, here more than ever, to masticate and moisten his food with saliva to the utmost.

To hasten evacuation of the stomach, one of the powders with a molecular concentration of $\Delta = 0.38$, described in an earlier section of this article, should be given between the attacks of pain and when-

ever any painful sensation is experienced. By this means the contact of the food with the stomach is shortened as much as possible.

Antisyphilitic Treatment.—There is a tendency at present in some quarters to consider that every duodenogastric ulcer is syphilitic.

For practical purposes, let us avoid all exaggeration, but likewise all blindness to actual possibilities.

Accordingly, in the presence of a gastroduodenal syndrome, definite knowledge or even suspicion of syphilitic infection should lead to the application of specific treatment.

Surgical Treatment.—During the acute stage, during the period of hemorrhagic complication, decision as to the need of operation should be held in abeyance. In grave cases, repeated hemorrhage may be relieved by operation, but this should be employed only as last resort.

During the periods of quiescence, the physician should not look upon all ulcers, even with the diagnosis definitely made, as requiring surgical treatment.

He should seriously try medical treatment, but decide on surgical treatment in the following three cases:

1. If the ulceration involves the pylorus, compromises gastric evacuation, and leads to a gastric residue, even slight, in the morning.
2. If the attacks do not respond to any medical treatment.
3. If the paroxysms become more frequent and take on the appearance of overlapping attacks.

Surgical Intervention.—The surgery of ulcers may be summed up as follows:

1. IN DUODENAL ULCER, with or without duodenal stenosis: Excision of the duodenal ulcer, gastroenterostomy or gastroduodenostomy, more difficult from the operative standpoint, but more physiologic, since it does away with the risks of peptic ulcer, the duodenum better tolerating the contact of the gastric contents.

2. IN GASTRIC ULCER, the operation of choice is gastrectomy, followed by a gastrojejunostomy or a gastroduodenostomy, end-to-end, which is the form of anastomosis of choice.

Simple gastroenterostomy, simple excision, or destruction with the thermocautery (Balfour) should only be exceptional procedures.

CANCER OF THE STOMACH.—The medical treatment of cancer of the stomach is, unfortunately, only palliative, but it is not non-existent, as some writers would have us believe. The surgical treatment, to be sure, can alone pretend to play a rôle which, if not curative, at least will appreciably lengthen the patient's life. To

accomplish even this much, the diagnosis of cancer must be made sufficiently early. Hence it is the duty of the physician to endeavor, by all means of investigation, clinical, physical and chemical, to establish this diagnosis as rapidly as possible. The period of survival afforded the patient by the operation varies according to the promptness with which the operation is carried out.

Yet in a case of definitely diagnosed cancer of the stomach, the rôle of the physician is far from being inconsequential. He must be able to alter and vary his recommendations and treatment, always for a psychic effect and sometimes for an actually serviceable effect; this he must do with all the greater perseverance from the fact of his knowing that the game is lost and that he must keep the patient from realizing it.

Cancer of the stomach may be treated medically under the following circumstances:

1. *Where the diagnosis has been tardy, the surgeon considers the case inoperable, or an exploratory laparotomy shows that the disease does not permit of operative removal.*

2. *Where the patient has been subjected to gastroenterostomy if the disease process is extensive or to gastrectomy if the growth is of limited extent.*

From the standpoint of treatment, only two alternatives require consideration:

1. *The pylorus or anastomotic orifice is functioning normally.*
2. *The orifice of evacuation is involved in the growth and its function is insufficient.*

This topographic diagnosis of the lesion is of essential importance, for here, as in all other gastric disorders, the evacuation of the stomach plays an outstanding rôle.

As long as the pyloric orifice is permeable, one can usefully combat malnutrition and cachexia. I have seen cancers of the body of the stomach forming beneath the abdominal wall masses of the size of several fists, yet compatible with a reduced but still surprisingly active life.

On the other hand, as soon as the pyloric region is invaded, as soon as evacuation of the stomach becomes poor, the disease begins to run a headlong course.

I. The Orifice of Evacuation is Permeable.—Under these conditions it is not only useless to carry out any lavage of the stomach, but even *disadvantageous*, since every gastric lavage, by diluting the gastric secretion, diminishes its activity.

Now, it is a well-known fact that in all cases of neoplasm of the stomach there occurs a degenerative change in the glands, with reduction of secretion, which quickly becomes general. This is demonstrated by the progressive diminution of the hydrochloric acid and all ferments (pepsin and rennin).

The physician's rôle, therefore, should be to make up, insofar as is possible, for this inadequacy of the secreted materials.

DIET.—It is important not to reduce the diet of these patients without some good reason for doing so. The physician should yield to the patient's appetite and wishes. He must, unfortunately, expect that the food intake will gradually be reduced by the patient himself, and must therefore himself be sparing of his dietetic and therapeutic reserve resources.

Meats.—Of all foods, meat is physiologically the least well digested by cancer patients. Indeed, the characteristic aversion of this class of cases for meat is well known. As a matter of fact, the secretion of gastric juice required for the digestion of protein diminishes very rapidly. The meats must, therefore, be given in the most digestible forms, such as chopped, cooked meat and pounded, raw meat. Lastly, peptones mixed with a little bouillon may be employed.

Vegetables.—Vegetables, especially in the form of starchy purées, are the best tolerated of all the foods in these cases. Indeed, we must recollect that the digestion of starches and their conversion into sugar under the influence of ptyalin takes place mainly in a non-acid medium.

Since the characteristic feature of the gastric medium in these cancer cases is that of not being acid, this conversion will take place to a maximal extent.

Accordingly, in cases of gastric cancer not involving the orifice, I found, after a test meal of bread, gastric media containing up to 6 per cent. of saccharine substances, whereas in an ulcer case the highest amount was 0.4 per cent.

This means that various starchy foods, mashed potatoes, pastes, etc., can be recommended to these patients.

Fats and Egg.—Fats, when incorporated in foods in the process of cooking, considerably retard their digestion. They form a protective coating of fatty material around the cells of the food which hinders the digestive action of the secretion of hydrochloric acid and pepsin.

As this secretion is already much diminished in the cancer case, *rich sauces* and *fried articles* must be interdicted.

On the other hand, fresh butter, potatoes à l'anglaise and eggs are generally well borne.

Milk.—Milk is often poorly borne by cancer patients, for the following reasons, which, I find, apply in a maximum degree in these cases, but which nevertheless also apply to a varying extent whenever the mucous membrane of the stomach is the seat of disease.

Milk, during its digestion in the stomach, is subjected to the action of a ferment, *rennin*, secreted by the gastric mucosa.

Coagulation of milk by rennin is not, as in the case of coagulation by acids, a mere precipitation of the casein by acidification, but is the result of an actual fermentative process or caseification which can occur in a neutral medium. Under the influence of this ferment, the casein of the milk is split into two substances, one of which is soluble in the serum, while the other, in the presence of soluble lime salts, constitutes the part which becomes precipitated, engulfing the fat globules in the process.

In short, the caseification of milk by the rennin is the first and the indispensable step in the digestion of milk.

This secretion of rennin, which is very abundant in all mammals during the period of lactation, becomes reduced in the adult as the gastric secretion adapts itself to a different type of diet.

In man, the rennin content of the gastric secretion varies in accordance with age and the condition of the mucous membrane.

Now, in cancer patients this secretion tends to fall towards zero, as is proven by determinations of the rennin in the gastric contents.

Therefore, in cancer cases, *milk may advantageously be mixed with a solution of rennin.*

II. The Pyloric Orifice is But Slightly Permeable.—When this complicating factor sets in, recourse should be had to gastric lavage.

In incomplete stenosis, to obviate delay in evacuation, a series of lavages is administered for several days in succession. Then, the patient being on a strict diet, the procedure is carried out only at longer intervals.

It should be kept in mind that these lavages must be performed as infrequently as possible and with the minimum amount of water.

With this end in view, I frequently insert the stomach tube in the recumbent position, with the patient lying face downward. In this way one succeeds (except in cases of tight stenosis with insufficiently broken up food residue) in emptying the stomach without any introduction of water. A cleaning out of the gastric cavity is thus effected without diluting the gastric juice.

DIET.—When stenosis sets in, the food should by all means be given in fractional amounts, consisting of milk in small quantities, eggs, and chopped or pounded meat.

Here, too, liquid articles, such as sugar solutions and peptone solutions, should in particular be given.

As last resorts, saline hypodermoclysis and rectal feeding may be availed of, and ultimately the patient should not be denied the comfort afforded by morphine.

Surgical Treatment.—The indications for surgical treatment are nearly always settled by the surgeon after he has opened the abdomen. They may roughly be outlined as follows:

No operation: *All cancers of the stomach with metastases (without pyloric obstruction).*

Gastroenterostomy: *Cancer of the pylorus with metastases.*

As the first stage of a two-stage gastrectomy.

Pylorogastrectomy: *All cancers of the stomach, whether involving the pylorus or not, without metastases.*

DIETETICS.

FOODS.—The dietary régime is one of the main preoccupations of the physician called upon to give therapeutic directions to a patient suffering from a disorder of the digestive tract.

Long are the diet lists—mostly copied the one from the other—with which the medical man feels it necessary to begin his scheme of instructions.

I have before me some of these diet lists, in which are painstakingly interdicted some of the most unusual articles of food. It would be interesting to know whether these colleagues with presumably normal stomachs have such elaborate bills of fare placed before them at their own tables. True, in order to avoid having to write out all these articles, some get over the difficulty by giving printed diet lists to their patients.

To whatever mistake in dietetics they may be committing in such a procedure they certainly add a psychologic mistake. For every patient, rightly or wrongly, considers himself a special case, in fact, the only case with which his physician is concerned. What will he think of this “omnibus” bill of fare that is handed to him? It can be confidently stated that in the resulting lack of confidence he will include both the diet and the physician.

Obviously, any stomach patient, of whatever variety, should avoid crude foods, rich sauces, gamy articles and elaborate cooking. But the patient has already put these measures into practice before consulting the physician, and when he does consult him, he has already long since eliminated all those culinary preparations which

the physician considers it incumbent on him to list under the heading "completely forbidden."

I shall go even further: Very often this exclusion diet is against the interests of the patient. We all know that among the patients with stomach complaints there is a group of neurotic cases that have a tendency to reduce their intake of food of their own accord.

One day, these patients will give up a certain food because they deem it harmful to their digestion; next day, another, and so on until they are finally in a condition of malnutrition. By exaggerating the exclusion diet the physician may himself bring on or increase such food phobias.

With these reservations made, let us now go over in a general way the points that may afford guidance in deciding upon the dietary instructions to be given our patients.

Classification of Foods According to their Rate of Evacuation from the Stomach.—In the disordered stomach, an unduly prolonged stay of the food in the gastric cavity is, above all, to be avoided.

Now, it seems scarcely necessary to add that evacuation varies in rapidity according to the state of division of the food material.

The pylorus acts as a strainer which allows the most finely divided materials to pass through and holds back the solid parts. The stomach does its work like a chemist who, when he wants to dissolve a salt of low solubility, grinds it in a mortar, adds a little water to it, decants it, and repeats this procedure until complete dissolution of the salt has been obtained.

Accordingly, foods may, from the standpoint of their physical state and that of their evacuation from the stomach, be divided into three groups:

Liquid foods: *Water, sweetened water, milk, eggs, strained vegetable bouillon.*

Semi-liquid foods: *Soups, milk preparations, thin purées, vegetable broth, meat pulp.*

Solid foods: *Bread, meats, vegetables, macaroni and other pastes, fish.*

This customary classification is more artificial than real. What is to be taken into account is not the food such as it is to start with, but the food such as it is when it reaches the stomach.

In my investigations on evacuation of the stomach I have often been struck by the fact that, at the end of a given period of time, in the same patient, a meal of milk will remain longer in the stomach than a meal of bread.

The milk had been ingested rapidly and had formed in the stomach a large curd, hard to break down; the bread, on the other hand, masti-

cated for a considerable time, reached the stomach as a kind of paste. This simple example shows that a food classed in the group of liquid foods may behave like a solid food in the stomach, and *vice versa*.

For this reason, given a sufficient degree of cooking and prolonged mastication, foods may be reduced to two groups: *Liquid foods* and *semi-liquid foods*.

Another feature requires mention in this connection. There is no doubt that the ease of evacuation of foods from the stomach varies with the degree to which it has been reduced to an impalpable mass.

Thus, as shown in my experiments, shelled vegetables passed out 30 per cent. sooner than unshelled vegetables, by reason of the cellulose residue contained in the latter.

Here we have a pronounced advantage as regards the stomach, but a pronounced disadvantage as regards the bowel, since we know that intestinal peristalsis varies according to the amount of foreign material present.

Hence we are confronted with this dilemma: To favor gastric evacuation while inducing constipation, or to avoid constipation while delaying gastric evacuation. To solve this difficulty, there should be given at meals finely divided foods, such as purées and shelled vegetables with a minimum of the foreign materials that are not attacked by the gastric juice.

On the other hand, the foreign materials required for intestinal digestion may be given in the form of *fruits*, agar-agar or linseed, provided they are ordered taken in the morning on an empty stomach, with a large glassful of cold water.

In this manner, these substances taken on an empty stomach simply pass through the stomach cavity; they promote the intestinal digestion without retarding the gastric digestion of food.

Classification of Foods According to their Action on Secretion.—To settle this question, it is necessary to go back to the classic experiments of Pawlow on esophagotomized dogs or dogs with a gastric fistula or a small artificial stomach.

The gastric secretion comprises two distinct types of secretion:

1. A psychic, automatic secretion, of central origin, governed by the appetite and the sense of taste, and which may be initiated without the entrance of any food into the stomach. This secretion appears upon the ingestion of any food, and may be said to vary in extent according to the amount of gusto with which the food is taken.
2. A reflex secretion, initiated in the stomach, and which varies with the different classes of foods.

This reflex secretion is very pronounced upon ingestion of meats.

It is nil with the starches.

It is negative with the fats, in the sense that fats exert an inhibiting action on the secretory nerves, as the following experiment shows: A dog with a small, artificial stomach is given 400 grams of meat. As a result, there are collected from the small stomach 52.1 c.c. of pure gastric juice. The experiment is repeated with addition to the meat of 75.5 grams of olive oil. The gastric juice collected in the same period of time is now but 17.9 c.c.

From such physiologic data the following **dietetic conclusions** are warranted:

1. To increase gastric secretion:

Excite the psychic secretion to the utmost by stimulating the appetite, by acting on the buccal papillæ with the bitters, the stomachics, and savory foods.

Excite the reflex secretion to the utmost by giving preferably broiled or roasted meats, excluding sauces and reducing the fats.

2. To reduce gastric secretion:

Reduce the psychic secretion to the utmost by giving only slightly spiced or seasoned foods, milk preparations, finely divided articles, purées, remaining in the mouth but a short time and coming in contact with the papillæ as little as possible.

And while this recommendation may seem paradoxical, the patient should be advised to masticate but little, to take only finely divided foods requiring no mastication, in order to reduce to the utmost contact with the papillæ, thereby diminishing as much as possible the psychic secretion.

Reduce the reflex secretion to the utmost by giving preference to the starches and especially to the fats, milk, butter and cream, which exert an inhibiting action.

Arrangement of a Meal.—In all cases with deficient evacuation of the stomach I recommend *beginning the meal with the starchy foods*. As is well known, the digestion of the starches in the stomach is carried on by the ptyalin of the saliva, and is hindered by hydrochloric acid. Plainly, therefore, one should delay the secretion of hydrochloric acid as much as possible in cases with poor digestion of starches, *e.g.*, in patients with hyposecretion. To this end, the starches should be given first, in order to avoid the psychic and reflex secretion which automatically results from ingestion of meat.

The truth of this contention can be demonstrated by determination of the sugars contained in the gastric fluids after a mixed meal. Where the subject has been made to ingest the starches before the

meat, the figures obtained for the reducing sugars will be found 15 to 30 per cent. higher than where the meat has been taken first.

BEVERAGES.—The usual recommendation to stomach patients to drink only water or hot infusions is altogether justified, but seems to me very incomplete, for it wholly fails to provide answers to the following three questions:

When shall the patient drink?

How much can he drink?

What beverage other than water should he use?

When shall the patient drink?—Aside from all scientific considerations, it is enough, in answering this question, to observe how animals drink. Has a dog ever been seen to interrupt his eating to drink? Is the teamster not in the habit of giving his horse a pail of water long before the oats? Indeed, common logic supports this mode of procedure, and it is only our civilization of epicures which has led to the habit of taking fluids in the course of the meals.

This conception of taking fluid between the meals is based on the following physiologic data:

1. In a patient with insufficient gastric muscles, it is very necessary not to overburden the stomach, and consequently it is advisable to take the water and food separately.

Indeed, a half liter of water taken separately, on an empty stomach, generally passes through in ten minutes; a half liter of water added to the food follows the course of the meal as far as evacuation is concerned, and consequently remains several hours in the stomach.

2. Again, the view that the fluid should be given after the meals is likewise a physiologic error, since a normal meal, in a healthy subject, remains for six to eight hours.

From these considerations I adopt the following precepts:

The water taken should be divided into two parts:

(a) *The water destined to be taken into the tissues, which should be taken on an empty stomach or a half-hour before meals.*

(b) *The water intended to promote digestion, which should be taken during or immediately after the meals.*

How much can the patient drink?—With a mixed diet including soups and green vegetables (which contain 80 to 85 per cent. of water), an adult should drink, on an average, 600 cubic centimeters of water a day.

These 600 cubic centimeters may be divided into two parts:

1. Four hundred cubic centimeters of water of hydration, *i.e.*, a large tumblerful of water taken one-half hour before lunch and dinner.

2. Two hundred cubic centimeters of digestive water, *i.e.*, about two teacupfuls of digestive infusion, taken with or after the meals.

What beverage is to be recommended?—As already stated, the water ingested as fluid may be divided into the water of hydration and a digestive beverage. The first should consist preferably of cold pure water or a mineral water of low salt content.

The digestive beverage, on the other hand, should possess the following two properties:

1. *It should be a hot beverage.*
2. *It should have digestive properties.*

1. **Hot Beverages.**—Everyday experience shows the favorable effects of hot fluids in gastric therapeutics. Their use at meals appears all the more advisable in that they exert an actual favorable action on the various functions of the stomach: Sensation, motility and secretion.

Indeed: (a) Hot beverages allay pain by reducing gastric hyperesthesia.

(b) They enhance motility by stimulating the muscle fibers of the stomach just as an injection of hot water induces contraction of the muscle fibers of the uterus in uterine hemorrhage.

(c) They favor the action of the gastric secretion; since the maximum activity of pepsin is exerted between 40 and 50° C., the digestion of proteins is effected under the most favorable temperature conditions.

2. **Beverages Possessing Digestive Properties.**—While medical men recognize the above various effects of hot beverages on gastric digestion, they generally manifest a complete lack of interest as far as the selection of the infusion to be recommended is concerned.

Imbued with the belief that the hot water is the active factor, they seek nothing more than to have the patient agree to use this hot water, allowing him to flavor it according to his taste.

Hence the infusions taken *ad libitum*—weak tea, chamomile, orange leaves, etc.—none of which infusions contain any principle acting on gastric secretion.

Departing from this mode of procedure, I have endeavored to find an infusion which, aside from its general properties as a hot beverage, would exert a special action on gastric digestion. *An infusion which seems to fill such requirements is the infusion of sprouted barley*, which I recommend for the following reason: When placed under certain conditions of humidity, the barley grain begins to germinate; in this connection there is formed around the developing embryo diastase, the starch-digesting ferment. This diastase, penetrating into the starch

reserve of the barley seed, transforms the starch into hydration products: Soluble starch, dextrin, sugars.

The barley, thus transformed, becomes malt and is used in the manufacture of beer; for this purpose the malt is extracted with boiling water, which dissolves the soluble substances derived from the starch and yields a sugar solution which, after fermentation and special manipulation, constitutes beer.

In this treatment of the malt with boiling water, let it be noted that the starch ferments completely disappear, the diastase being, indeed, destroyed at about 100° C. Hence the *lack of utility of beers as digestive beverages*.

But if, instead of pouring boiling water on the sprouted barley, as is done in the manufacture of beer, this barley is treated with water at about 70° C., there is obtained not only, as in the first instance, a simple solution of saccharine products, but also a solution of diastase which is extremely active, since this diastase, soluble in water, exerts its maximum of saccharification between 60 and 80° C.

It is the infusion of sprouted barley thus prepared that I recommend to my patients.

The sacchariferous properties of this infusion of sprouted barley can easily be demonstrated. If an infusion of this barley is placed in contact with a solution of starch paste, the starch is observed to become transformed, under the influence of the diastase, into saccharine products which can be tested for and quantitatively determined with Fehling's solution.

In man, the transformation of starch in the stomach, which implies the digestion of all foods of vegetable origin, is carried out through a similar process, under the influence of the ferment contained in the saliva. But this ferment action, which begins during mastication and is continued in the stomach, is frequently compromised.

It is well known, indeed, that under various circumstances, such as unduly rapid mastication or excessive secretion of hydrochloric acid which destroys the salivary ferment in the stomach, starch digestion is compromised in the majority of cases of gastric disease.

In the presence of impaired gastric digestion it may be surmised, therefore, that the taking of an infusion of sprouted barley during the meal will make good this insufficient conversion of the starches and thus improve digestion.

That this is so can be observed after a test meal. If the same patient is given on two successive days an Ewald meal consisting on the first day of bread and tea and on the second day of bread and an

infusion of sprouted barley, the saccharine products are found more abundantly in the gastric contents after the second meal.

In short, for the reasons mentioned, I recommend the infusion of sprouted barley as a digestive beverage, and to obtain this beverage with the maximum degree of sacchariferous power I prepare it as follows:

Grind up a tablespoonful of sprouted barley, place it with a teacupful of cold water in an earthen or porcelain (not a metallic) vessel, and heat the latter for ten minutes on a water-bath of boiling water. Strain and sweeten like any ordinary infusion.

This infusion, as already mentioned, is taken as a digestive beverage in the course of or after the meal.

SALIVATION.—ITS THERAPEUTIC RÔLE.—"Masticate the food thoroughly" is the cardinal admonition seen at the beginning of every list of dietetic instructions.

It is good advice, but is far from being sufficient. Indeed, a person having good teeth masticates efficiently and grinds the food down easily and rapidly. On the other hand, a person with defective teeth chews with difficulty, slowly, and fights with his food.

Now, paradoxical as this conclusion may seem, in an account of 380 cases I issued in 1907, it was among the members of the first of the above groups that I found the greater number of dyspeptic disturbances.

In these persons, indeed, the *easy and rapid mastication occurs in inverse ratio to the salivary secretion*, and it is this salivary insufficiency which, in my opinion, is at the bottom of the digestive disturbance originating in the oral cavity.

Most of these cases of salivary dyspepsia are, as a matter of fact, met with among young subjects twenty to thirty years of age, with very good teeth, sober and active, but who, by temperament, habit, and especially occupational necessity, eat very quickly. Office or store employees, working girls, and persons who read while eating or frequently leave the table made up a great portion of my cases of this type.

To demonstrate the insufficiency of salivary digestion in these patients, the amount of saliva secreted during the mastication of a definite meal can be measured. To this end, the subject is made to masticate 20 grams of bread crust, with instructions to chew it *in a normal manner* and discharge each mouthful into a vessel of known weight at the moment when there arises the impulse to swallow it. By weighing the receptacle the quantity of saliva secreted can thus be ascertained.

By way of illustration, following are the amounts of saliva secreted under these circumstances by a few patients:

Age.	Teeth.	Saliva secreted.
20 years.	Excellent.	5.8 grams.
47 "	Good.	7.3 "
32 "	Average.	10.3 "
21 "	Bad.	18.2 "
57 "	Bad.	16.5 "

These examples show that the amount of saliva often bears an inverse relationship to the quality of the teeth of the patients.

In a normal person, with 20 grams of bread crust, the amount of saliva secreted is 12 to 15 grams. Below 12 grams, I regard the secretion of saliva as insufficient.

To gain a proper understanding of the **digestive disturbances to which deficient salivary secretion may lead**, let us recall that, in the stomach, it is solely through the ptyalin of the saliva that conversion of the starches into sugar occurs.

The reaction of the medium (acidity) exerts, to be sure, a marked influence on this digestion of the starches; but the saliva plays the principal rôle and it is enough to recall that in our experiments, after a meal of bread the amounts of saccharine substances found varied in different patients from 2 to 70 grams per 1000 cubic centimeters of fluid withdrawn from the stomach.

In view of such variations, the extent to which gastric digestion may be disturbed by salivary insufficiency will be easily realized.

Treatment.—When confronted with a patient in whom one suspects salivary insufficiency as one of the causes of the digestive disturbances, what should one do?

Advise the patient to *eat slowly*, as the amount of salivary secretion varies according to the length of *time the food remains in the oral cavity*.

But everyday experience show how fruitless this recommendation is, the patient admitting of his own accord that he cannot keep himself from masticating quickly. The physician is compelled, therefore, to remedy in a measure this insufficiency of insalivation.

Following are the instructions which I give to these salivary dyspeptics:

Diet.—This is the type of patient who should particularly be advised to begin his meals with the paste-foods and starches. The introduction of the meats or proteins into the stomach first excites a secretion of hydrochloric acid and pepsin which arrests the action of the saliva, already insufficient in these patients.

A second recommendation I often make to salivary dyspeptics concerns the cooking of the food. Saliva, an alkaline fluid, acts mainly in a slightly alkaline medium (Claude Bernard); to give the starches their maximum digestibility it is necessary to make them slightly alkaline. It is to this property, indeed, that certain vegetables served in the restaurants at Vichy, previously cooked in the local mineral water, seem to me to owe their special digestibility.

I have observed chemically after test meals this improved digestibility of starches thus alkalinized and, by way of illustration, describe herewith the mode of preparation of an alkaline rice which I frequently prescribe and of which I have demonstrated the rapid conversion into sugars in the stomach.

Cook for about twenty minutes one part of Indian rice (this rice remains in the form of grains in spite of the cooking), one part of Vichy water, two parts of plain water and a sufficient quantity of salt. Then remove from the fire and stir the rice while keeping it at a low heat until the water has evaporated.

To the rice thus prepared butter may be added if desired.

Masticatories.—I have already said that the best treatment of salivary dyspepsia consists in advising the patient to chew his food for a long time; as this recommendation is not followed to any great extent, the widespread use in North America of chewing gum, which has for its purpose to make the patient secrete saliva by compelling him in a pleasant way to masticate after meals, is readily understood.

In the course of a trip to the United States and Canada, I was much struck by the large number of Americans who, after their meals, chew this gum, advertised as "pepsin gum" or "chewing gum," and which is merely a flavored insoluble resin, *containing not a trace of pepsin*.

This procedure of chewing after meals is, indeed, not exclusively a habit of the Americans, a nation of people who carry on "business" and mastication with equal rapidity and who, accordingly, it would appear, hold the record in salivary dyspepsia [!].

While the inhabitants of the West use chewing gum, those of the East chew the betel nut, those of Persia chew mastic, and those of Europe chew ordinary tobacco; all of these products are masticatories which serve the same purpose.

Even in veterinary medicine this therapeutic procedure has long been utilized: To combat the digestive disturbances of young horses that eat too quickly, a small mass of insoluble resin, generally asafetida, is fastened to the horse's bit in order to induce a flow of saliva.

Following are the results I obtained with the American masticatory:

Upon chewing it for an hour, the amount of saliva produced may be put down as 100 to 150 cubic centimeters.

Taking into account the fact that to swallow 100 grams of bread the patient secretes only 15 to 20 cubic centimeters of saliva, it will be seen that, through the action of the masticatory alone, the patient is caused to pour into his stomach five or six times this amount of saliva.

In another series of experiments, let an individual be given a meal of bread on two successive days; on the first day, the meal is withdrawn in the usual way; on the second day, during the hour's interval, we give the patient a masticatory, instructing him to chew it and swallow the saliva.

Comparison of the two meals thus withdrawn after the same length of time shows, upon quantitative determination of the sugars, that the digestion of the starches gains by 30 to 50 per cent. through the action of the masticatory.

Indeed, the practice of such mastication after meals by thousands of people of a wide variety of nations appears to me to confirm the efficacy of this treatment, empiric though it may be, to a greater extent than all of my laboratory experiments.

PSYCHIC FACTOR.—The psychic factor always has a part in dyspeptic states; it is therefore of prime importance to take this factor into account in a rational plan of treatment.

Here, for example, is a type of patient often met with in practice: A subject rather young than old and oftener a woman than a man. The outstanding symptom is loss of weight; this loss of weight is progressive and may reach 50 per cent. of the patient's original weight, constituting a constant, daily preoccupation of the patient and his family. To this outstanding feature are to be added all the symptoms that may be encountered in gastro-intestinal diseases, including loss of strength, puffing with gas, late pain, constipation and mucoid stools. Needless to state, the mental condition corresponds to the physical and the patient is convinced that he will never get well.

The patient is given a thorough examination, covering the digestive tract, the lungs, the heart, the urine, etc., not only in order to afford a firm foundation for the diagnosis, but also to show the patient that no possibility of a mistake has been allowed to creep in.

The diagnosis is made: No irremediable lesion exists. What course is the physician to follow?

In the first place, he should gain the confidence of his patient, and it is in this that the physician must possess the power of suggestion that works miracles.

Being himself convinced of the possibility of recovery, he must transfer this conviction to his patient.

By what means? Personal authority, processes of reasoning and persuasion. Each one will proceed according to his temperament and character; but it can be confidently stated that success is the criterion of the physician who possesses the gift of persuasion, which is and will remain the indispensable quality of the practitioner.

As soon as the physician feels that he has secured the confidence of his patient, he may be said to have won the battle.

Having gotten thus far, here are the two indications which it is necessary to impose on the patient.

1. Rest.

2. Superalimentation.

Rest.—Where marked loss of weight has occurred it is essential to build up a physical reserve, and this can be done only with the patient at rest in bed.

Rest in bed: Economy in exertion, economy in heat, and consequently, economy in food fuel.

The bed is an artificial incubator which places the body in ideal temperature surroundings.

It also means relative withdrawal from social life and emotional life. There results a conservation of the assets of nervous strength which is added to the conservation of the assets of physical strength.

Furthermore, there should be no compromise. Insist on rest for two weeks, a month, or six weeks; no half-measures, no reclining on couches or home dinners.

Superalimentation.—Conservation having been instituted to the uttermost degree, the destroyed capital must next be replaced. Now, one is always confronted with organs which have lost the habit of working. The patient has experienced some pains or vague discomforts. In the human machine, the digestive tract is so complicated that not a week passes without our noticing a few slight hitches in its functioning. The normal person pays no attention to them; but the neurotic subject dwells on them. He ascribes his discomfort to a certain food and gives up its use. Next day, there is again discomfort and another food is abandoned. Then there follows gradually the descent into the abyss: Voluntary cessation of eating, loss of weight, physical and mental inferiority.

To reverse this trend, two alternatives are open to the physician:

The *mild* method, which aims to increase the food intake gradually.

The *violent method, which consists in imposing on the patient at once a sufficient intake of food.*

It is this last procedure which I employ.

As soon as the patient is in bed, subject him to a diet of two meals, noon and evening, with selected but quantitatively sufficient foods. Between the meals, add $1\frac{1}{2}$ liters of milk taken in three divided amounts at 8 and 10 a.m. and 4 p.m. Needless to state, every patient will object: "I don't like milk; it brings on diarrhea." Argue with the patient, but stick to the instructions given. After a few days of strife the patient gets out of his rut, proceeds to gain weight rapidly, and the battle is won.

THE INTESTINES.

DYSENTERIFORM DIARRHEA OF PARASITIC ORIGIN.

—Parasitic dysenteriform diarrhea of a chronic type or with paroxysmal recurrences may be caused by various organisms, and can be differentiated only by bacteriologic examination.

Colon Bacillus Dysentery.—This is the commonest form, and yields to a reduced, vegetarian diet and gentle laxatives.

Amebic Dysentery.—This was the commonest form of dysentery met with on the Eastern Front in the world war, and accounted, with malaria, for the greater part of the sickness among the troops.

It is distinctly featured, upon examination of the stools, either by the amebæ or the amebic cysts.

Amebæ.—These organisms are to be recognized by their pseudopodia, their marked motility and their endoplasin containing many erythrocytes.

Amebic cysts.—These appear in the form of small, refractile spheres. They are featured by nuclei not exceeding four in number and by a refractile layer known by the term chromidia.

Treatment.—A milk and vegetable diet.

Emetine hydrochloride, 0.06 to 0.08 gram (1 to $1\frac{1}{4}$ grains), on three successive days.

Neoarsphenamin, 0.15 to 0.2 gram, on one day.

Irrigations with 0.1 per cent. silver nitrate solution.

At the end of a week the stools are examined. If amebic cysts are still found, a second course of treatment is given.

If no cysts are found, no further treatment is given for a week, after which the stools are again examined.

If the cysts have reappeared, the treatment is repeated.

Bacillary Dysentery (*acute or chronic*).—In this condition the stools contain a highly motile rod rather similar in appearance to the colon bacillus. It is Gram-negative.

Treatment.—A milk diet.

Hypodermic injection of 20 cubic centimeters of antidysenteric serum. In severe cases, 40 and even 100 cubic centimeters should be given.

If the stools are foul, irrigations with 1:2000 potassium permanganate solution or 1:5000 silver nitrate solution may be administered.

The patient should be allowed to drink water *ad libitum* in order to make up for the general dehydration resulting from the diarrhea.

Dysentery Due to Lamblia (Giardia) Intestinalis.—The latter is a flagellate protozoön.

Its cysts are distinguished from the amebic cysts by the larger number of nuclei (exceeding four) and the oblique lines visible within the cysts.

Treatment.—*Lamblia* is very resistant to all treatment.

Thymol, santonin and emetine should be tried; they may fail.

COLITIS.—Aside from the above dysenteriform diarrheas of parasitic origin, there occur inflammations of the colon concerning which there have been built up numerous pathogenetic theories without great practical value (specific origin, enteroneuritis, thyroid origin, neuropathic origin, etc.).

From the therapeutic standpoint, which alone concerns us, we must remember the following facts:

Inflammations of the large intestine may consist of:

1. Acute colitis, frequently engrafted upon the chronic, or often occurring as a result of some form of poisoning, an indiscretion in diet, or in the course of an infection.

2. Subacute colitis, which may be divided, from the therapeutic standpoint, into two types, depending on the regions affected, *viz.*:

The right large intestine, comprising the cecum, ascending colon, and the right half of the transverse colon.

The left large intestine, comprising the left half of the transverse colon, the descending colon, and the pelvic colon.

This division is by no means an arbitrary one; it is dependent upon the pathologic and physiologic unity characterizing each of these two regions.

Acute Colitis.—Acute forms of colitis are manifested by a more or less dramatic onset, with frequent stools of dysenteriform appearance, abdominal pain, temperature, etc.

During this period the patient should be kept in bed, with heat continuously applied to the abdomen; warm, moist compresses should preferably be used, being more soothing than dry heat.

Diet: Restriction to water for twenty-four or forty-eight hours, then light broths and soups with a vegetable foundation.

Milk in all its forms is to be interdicted.

Few, or no drugs should be used: Opium or belladonna in fractional doses.

Subacute Colitis.—This form, whatever be the portions of the bowel affected, often reacts on the mental state. Therefore a course of psychotherapeutic treatment should always be combined with the local treatment.

From the local viewpoint, however, it is essential to be able to locate the affected intestinal segment, in order to institute a rational treatment, the right or left large intestine each exhibiting a pathologic and physiologic unity.

Right Large Intestine.—*Physiologically*, the digestive residues reach this region in the liquid state.

The activity of the digestive juices of the ileum disappears and is replaced by bacterial digestion. It is in the right large intestine that the starches, and especially cellulose, undergo a molecular disintegration which ends in an amylaceous fermentation showing acid with litmus paper.

Coprologically, the stools appear diarrheic, frothy, and acid.

In them are found starch débris, starch granules, iodophilic bacteria, and little or no muscular fiber.

Clinically, there are frequent liquid, acid stools causing a burning sensation at the anus.

The general health is frequently affected.

Right-sided colitis with constipation is uncommon; it is caused only by severe ptosis, dolicho- or megacolon, or Lane's kink.

TREATMENT.—If the inflammation appears to be located mainly in the right large intestine, the treatment should be directed toward the following two objectives: To assist the digestion of starches, in order to avoid amylaceous fermentation, and to treat the diarrhea by delaying peristalsis of the right large intestine. Starch fermentation is to be reduced.

Only perfectly divided starches should be given (cream of rice; various flours). Gruels should be given as *malted gruels*. Starches are to be replaced by natural sugar. Cellulose is to be avoided (green vegetables). After each meal, the salivary secretion is to be activated by chewing gum. Saccharification in the stomach should be favored

by diminishing the gastric acidity (Vichy water, alkalies, bismuth subcarbonate, calcium carbonate, after meals).

Peristalsis of the right large intestine should be delayed (opium in any of its forms).

Left Large Intestine.—**Muco-membranous Colitis.**—*Physiologically*, the digestive residues, after undergoing a gradual dehydration, reach the left large intestine in a solid state.

Bacterial action is exerted in the left large bowel upon the proteins which have escaped the ferments of the small intestine. The molecular disintegration of these nitrogenous matters ends in *ammoniacal* putrefactions *alkaline to litmus*.

Coprologically, there are constipation stools. These are *alkaline*.

There are found practically no food residues, few muscle fibers, the nuclei of which have disappeared, little fat, no starches. Digestion is complete. In fact, there is a superdigestion. Presence of mucus, characteristic of muco-membranous colitis, together with membranes; coagulation of mucus under the influence of Roger's mucinase.

Clinically, the patients generally have constipation or pseudo-diarrhea, which is simply a constipated stool diluted with secreted fluid.

To the CONSTIPATION is added the expulsion of mucus and of MUCO-MEMBRANES, and the PAIN element, related to spasm of the colon.

These three features characterize the typical muco-membranous colitis.

TREATMENT.—If the inflammation appears to involve mainly the left large intestine, treatment should be directed towards the two following objectives:

To obviate as much as possible nitrogenous putrefaction.

To combat the fecal stasis.

(a) *Reduction of Putrefaction.*—Meats and raw milk are to be interdicted. Starches and vegetables containing cellulose (green vegetables) are to be given.

The agencies concerned in putrefaction are to be combated with lactose, fermented milks, bismuth subsalicylate and lactic acid bacilli.

Massol discovered the *Bacillus bulgaricus*, which gives in cultures the largest yield of lactic acid. The bacillus of Massol is being given when one prescribes lacto-bacilline.

Tessier has proposed the use of another organism, the *Bacillus bifidus*. In his bouillon, Tessier has combined this with the paralactic organism.

Control of Fecal Stasis.—No copious irrigations of the bowel should be administered. The oil enema is the ideal treatment (3 or 4 table-

spoonfuls, to be retained over night. Next day, a small evacuant enema (see *Constipation*).

Spasm is to be combated with belladonna.

Physiologic laxatives: Agar-agar and liquid petrolatum.

APPENDICITIS.—Appendicitis is a disease of infectious origin starting in the appendix. Many are the factors which may modify its clinical picture (single or combined bacterial infection, streptococci or colon bacilli, an open or closed cavity—the latter through interruption of all direct communication with the intestine).

The clinical course is thus rendered so variable that it is hard to follow any single plan of management, and it is impossible, in practice, to accept as an axiom the rule laid down by some to the effect that **every case of appendicitis seen within forty-eight hours from the onset must be operated on at once.**

1. Apprehension of Appendicitis.—Slight pain or tenderness at McBurney's point. First attack. No fever and no vomiting.

TREATMENT.—Rest in bed.

Liquid diet: Milk and vegetable broth every two hours.

In the event of constipation, no laxatives, but the bowel may be emptied with oil enemas.

For the pain, linseed poultices or hot moist compresses.

In the event of diarrhea, one to four pills of extract of opium, each 0.01 gram ($\frac{1}{6}$ grain).

The patient should be closely observed and the pulse and temperature compared.

Surgical Treatment.—If there is but one, ill-defined attack, medical treatment is to be tried: Vegetable diet; capsules of thymol, 0.5 gram ($7\frac{1}{2}$ grains), one to four daily for several days if the stools contain trichocephalus (threadworm) ova.

If the attack recurs, even in an atypical form, an interval operation should be recommended.

2. Established Appendicitis.—Appendicular point of tenderness, cutaneous hyperesthesia, rigidity in the same area, fever, nausea and vomiting.

IMMEDIATE SURGICAL TREATMENT.—If it has been possible to make the diagnosis in the first forty-eight hours of the disease, immediate operation is to be advised.

Otherwise, **MEDICAL TREATMENT:**

Immobility and restriction to iced pure water or champagne frappé in teaspoonful doses.

An ice-bag continuously on the abdomen, with intervening flannel protection.

The Lithiasic State.—From the standpoint of treatment, one should not rest satisfied with the old pathogenetic explanation of Bouchard, coupling cholelithiasis with the disorders due to slow metabolism. This pathogenetic conception, based on inadequate biochemical observations, does not lead to any scientific plan of treatment.

The labors of Chauffard and Grigaut on cholesterinemia should be duly taken into account.

The cholesterin content of the blood always increases when an individual is tending to develop a lithiasic condition. Thus, such an increase is observed in pregnancy, which often predisposes to hepatic colic.

Such concurrences cannot be mere coincidences and lead almost inevitably to the conclusion that hypercholesterinemia is one of the constant pathogenic accompaniments of cholelithiasis.

This cholesterin in the blood may be derived from the food (hence the need of a diet low in cholesterin); it may also be a product of abnormal secretion of the endocrinal glands, such as the corpora lutea of pregnancy.

We must bear in mind likewise another fact pointed out by Grigaut. Certain functional disturbances of the liver result in an underproduction of the bile-salts, which are the agents concerned in the solubilization of cholesterin. In the lithiasic state there is the following twofold condition: The increase of cholesterin in the blood and bile, on the one hand, and the diminution of its solvent principle (bile-salts) in the bile, on the other, lead to a precipitation of this cholesterin in the form of calculi.

All these considerations permit of formulating provisionally a plan of treatment for lithiasis.

It should be remembered, however, according to Chauffard's formula, that the clinical age of cholelithiasis is not its pathogenic age, *i.e.*, that when a patient has his first attack of hepatic colic, the lithiasis had set in long before.

Let us recall the minor signs of cholelithiasis which should lead to dieting and other treatment:

Indigestion, which cannot be distinguished from the usual dyspeptic state with its *aërophagia* and late pains related to pyloric spasm.

Prandial diarrhea.

The gastralgic attack, or miniature attack of hepatic colic.

Migraine, pain in the right shoulder, Murphy' sign, Abrahams' sign, etc.

Diet.—The diet must be followed not only when there are symptoms but also during the intervals.

It should meet two scientific indications:

1. To exclude as completely as possible the fats, the saponification of which may be compromised by the insufficiency, quantitative and qualitative, of the biliary secretion. *Hence, interdict rich sauces, fried foods, and fat meats and fish.*

2. To exclude as completely as possible the foods rich in cholesterol, which may be grouped as follows:

(a) To be **interdicted**: Articles very rich in cholesterol:

Egg yolk, cheeses, cream, brains, sweetbread and liver.

(b) To be **tolerated**: Articles rather rich in cholesterol:

Milk; certain dried vegetables which contain vegetable cholesterol, viz., split peas, lentils and beans.

(c) To be **allowed**:

All the green vegetables, fruits, pastes, roasted meats and lean fish.

General Hygienic Measures.—Combustion to be activated as much as possible by active life in the open air, douches, hot affusions and general rubs.

It should be remembered, however, that violent exercise may bring on an attack of pain. Accordingly, strenuous sports, sudden exertions and prolonged journeys by train or automobile should be avoided.

The wearing of an abdominal belt should be advised.

Medicinal Treatment.—There are two indications:

1. Cholagogue medication.

2. Antiseptic medication (biliary channels and intestinal canal).

1. **Cholagogue Medication.**—*Olive Oil.*—To be taken in the morning in ascending doses. Begin with five or six tablespoonfuls in the morning on an empty stomach. Increase daily by one tablespoonful for about eight days. The patient thus gets accustomed to taking 150 to 200 cubic centimeters (5 to 6 $\frac{2}{3}$ ounces) of olive oil.

Strictly Fresh Butter.—It often happens that the patient does not tolerate the oil well. It may be replaced by strictly fresh butter, which acts in the identical manner, *viz.*, by enhancing the secretion of bile, which is necessary for its saponification. Under these circumstances, the patient should be made to take as his breakfast boiled potatoes buttered with one-half their weight of butter. He can thus work up to 50 to 80 grams (1 $\frac{2}{3}$ to 2 $\frac{2}{3}$ ounces) of fresh butter.

Haarlem Oil.—A product of indefinite composition containing oil of cade, oil of turpentine and laurel berries.

It should be given in an emulsion in syrup of acacia in doses of 5 drops a day, or in capsules of 0.2 cubic centimeters (3 minims) each, one or two a day. The drug has caustic properties and cannot be continued very long.

Boldo (Boldus, N. F.).—Action as cholagogue problematic; said to act as a liquefier of the bile.

It may be given as an infusion of the boldo leaves, 2 grams (30 grains) to a cupful of boiling water; in the form of the tincture, 20

drops after meals, or as boldine, the alkaloidal active principle, 0.005 to 0.01 gram ($\frac{1}{12}$ to $\frac{1}{6}$ grain) in granules.

[*Fluidextractum boldi*, N. F., 0.5 c.c. (8 minims).]

Mineral Waters.—These act mainly as cholagogues. Furthermore, they are used for external treatment (baths or douches).

Vichy is suitable in the majority of lithiasic cases.

Such waters as Pougues, Contrexéville, Vittel and Martigny also act on the biliary secretion. With large amounts, expulsive attacks may even be observed.

How do the mineral waters act? The experience of the patients is sufficient to accredit their effect and confirm the tests of hepatic functional activity (showing improvement of the function of bile production and diminution of cholesterinemia) (Mauban, Biscous and Rouzaud).

2. Antiseptic Medication (intestinal and biliary).

Saline purgatives in small doses.

It should be remembered that bile has a powerful action on intestinal peristalsis. The insufficiency of bile in lithiasic cases should therefore be made good in this respect by promoting peristaltic activity with mild laxatives.

The intestinal upsets with fever met with in certain complications of cholelithiasis will thus be avoided.

Sodium sulphate, 3 to 5 grams (45 to 75 grains), or sodium citrate, 5 grams (75 grains), may be ordered taken in the morning on an empty stomach in a glassful of Vichy water.

Calomel.—This is both an antiseptic and a cholagogue.

℞ Hydrargyri chloridi mitis	0.05 gram (gr. $\frac{3}{4}$);
Lactosi	0.2 gram (gr. iij).
Pone in chart. No. i. Da tal. No. vi.	

One of these powders should be ordered taken hourly until greenish stools appear (as cholagogue); or, one powder may be taken every morning as an intestinal antiseptic.

Sodium Salicylate.—This is often employed in combination with sodium benzoate, as in the following formula:

℞ Sodii salicylatis	0.5 gram (gr. viij);
Sodii benzoatis	0.25 gram (gr. iv).
Pone in cachet. No. i. Da tal. No. xxx.	
Sig.: Two to four cachets a day.	

Methenamine.—This seems to exert an antiseptic effect on the bile. Given to patients with biliary fistulas following operation, it leads to a rapid diminution of bacterial pullulation in the bile.

One to three 1-gram (15-grain) cachets of methenamine may be given in twenty-four hours.

In certain severe cases, injections of the drug are feasible. One to four injections of 1 cubic centimeter (16 minims) of a 20 per cent. solution may be given *per diem*.

External Treatment.—For gastric disturbances and gall-bladder pain of cholelithiasis, one can use diathermy with success. This electric modality has for its purpose to develop heat through the whole thickness of the tissues, instead of only quite superficially, as is the case with the ordinary thermogenic agencies.

The procedure consists in passing a current of 1500 to 2000 milliamperes through two electrodes placed on the hepatic region.

Painful Complications.—*Hepatic colic* is the hallmark of cholelithiasis. Its **medical treatment** may be summarized thus: *Heat* and *sedatives*.

LOCAL HEAT.—Hot cloths, hot irons, sandbags, wet compresses, or poultices sprinkled with laudanum.

Special reference should be made to the prolonged hot bath. The patient is placed in a bath at 36° C. (96.8° F.) and the bath made gradually warmer until it is as hot as the patient can stand. Relaxation is thus procured for the patient and probably also for the biliary channels, often with immediate favorable results. Care should always be taken to have some one stay by the bath-tub to watch the patient.

SEDATIVES.—*Locally.*—Liniments based on chloroform, laudanum or compound oil of hyoscyamus (N. F.).

By the Mouth.—Chloroform water, syrup of morphine (0.067 per cent.).

Preference should be given to amyl valerate—one capsule containing 0.5 cubic centimeter (8 minims)—which, aside from its property of relieving spasm, tends to dissolve cholesterol.

By the rectum:

Suppositories:

℞ Extracti opii (N. F.),
 Extracti belladonnæāā 0.02 gram (gr. ⅙);
 Olei theobromatis q. s.
 Ft. suppos. No. i.

Enemas of antipyrin, 2 grams (30 grains) in 100 cubic centimeters (3⅓ ounces) of water.

Subcutaneously:

An injection of morphine constitutes the treatment of choice.

To reduce the intensity of the spasm, atropine may be combined with it, *e.g.*, morphine hydrochloride, 0.01 gram (⅙ grain), with atropine sulphate, 0.0005 gram (⅓₁₀ grain).

Surgical treatment.—This is an exceptional treatment only.

The indications for it are: A succession of attacks without intervening complete cessation of symptoms; repeated attacks leading to the fear of morphine habit; occlusion of the large biliary channels (common duct), and threatening inflammation of the biliary passages.

Inflammatory Complications.—The inflammatory complications of cholelithiasis may be divided into two groups:

1. Catarrhal cholecystitis, often fibro-atrophic and nearly always calculous.

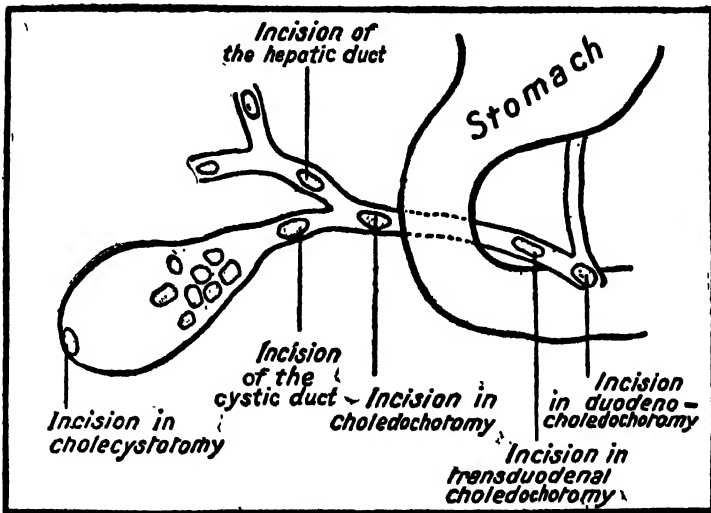


Fig. 342.—Diagram showing the various possible locations of gall-stones and the operations correspondingly indicated.

2. Suppurative cholecystitis and suppurative cholangitis.

Calculous Catarrhal Cholecystitis.—This is a common form, which gives rise to nearly all of the symptoms and signs ascribed to cholelithiasis (Murphy's sign, R. Abrahams's sign, prandial diarrhea, late pain, gastralgic attacks). It should be borne in mind, however, that there can occur cholecystitis with a stoneless gall-bladder. The absence of gall-stones alters neither the medical treatment nor the operative indications.

This disorder calls for the following medical treatment for as long a time as it yields improvement:

Rest; avoid abrupt movements and travelling.

The diet for cholelithiasis.

Prolonged hot baths.

Wet applications.

If, however, the pain continues, interspersed with gall-bladder colic; if the patient becomes thin, and if slight febrile movements appear, one should bear in mind, as specified by Chauffard, that any biliary infection threatening to induce suppuration formally indicates operative intervention. We may add that if an X-ray examination discloses gall-bladder calculi, the necessity for operation is further confirmed. Non-visibility of the gall-bladder under the X-rays after injection of a salt of tetrabromophenolphthalein is likewise in favor of operation (Graham and Cole).

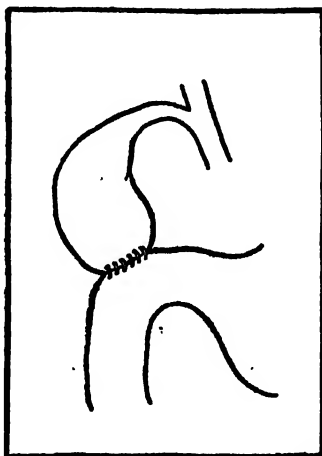


Fig. 343.—Cholecystenterostomy.

OPERATION.—The operation of choice is cholecystectomy.

Suppurative Cholecystitis or Suppurative Cholangitis.—Medical treatment is called for at the beginning of the condition. The same course should be followed as in appendicitis, and, if possible, operation not resorted to until after subsidence of the symptoms.

The measures to be ordered comprise, therefore:

Rest in bed.

Ice applications.

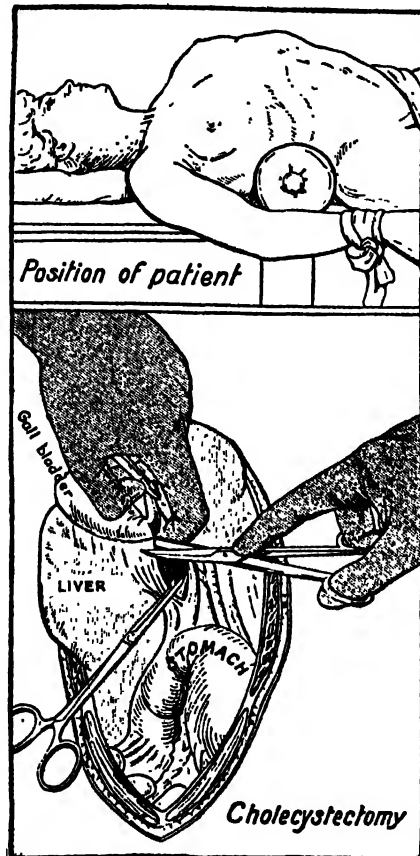
Injections of morphine, if there is severe pain.

Cold enemata daily.

Methenamine or intravenous injections of colloidal metals.

OPERATION.—If there is persistence of pain, of temperature oscillations and of polymorphonuclear leucocytosis, operation should be advised.

In *suppurative cholecystitis*, the operation of choice is cholecystectomy. Frequently, however, the surgeon has to rest satisfied with a cholecystotomy, the opening of the gall-bladder sometimes constituting merely the first step to a more thoroughgoing operation.



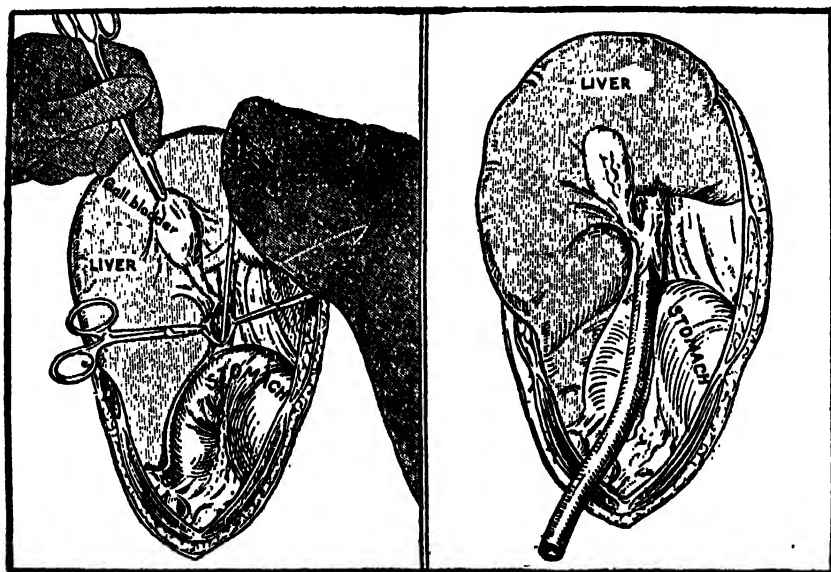
Figs. 344 and 345.

In *suppurative cholangitis*, drainage of the hepatic duct, frequently combined with cholecystectomy, constitutes a serious operation, in which the prognosis should be very guarded.

THE PRINCIPAL OPERATIONS ON THE BILIARY TRACT.

The choice of the operation rests exclusively with the surgeon; the selection is generally made only after exploratory laparotomy.

Cholecystostomy consists in opening the gall-bladder; the contents of the latter having been evacuated, it may, in theory, be closed immediately, but, in practice, preference is given to *cholecystostomy* or the institution of an artificial biliary fistula. Cholecystostomy protects against infectious complications by providing for drainage of the infected bile; it often leads to spontaneous removal of obstruction of the cystic duct by reason of the increased flow of bile; it may be supplemented by a secondary choledochotomy.



Choledochotomy.

Drainage of the biliary tract.

Figs. 346 and 347.

Cholecystectomy consists in removal of the gall-bladder and its contents. One is justified in undertaking it only when permeability of the bile-duct is a certainty.

Cholecystenterostomy consists in establishing communication between the gall-bladder and the intestine in order to restore bile circulation when the common-duct is obstructed; this operation has the serious drawback of exposing the liver to infection from the intestine.

Choledochotomy consists in making an incision into the common bile-duct in order to extract stones and for the purpose of drainage of the hepatic duct.

CIRRHOSIS OF THE LIVER.

The cirrhoses of the liver have long been divided, in accordance with their pathologic features and the distribution of the fibrous tissue, into venous cirrhosis and biliary cirrhosis. Their pathology is now revealing so many intermediate forms (*e.g.*, the mixed cirrhoses of Dieulafoy) that this division is gradually being abandoned. From the standpoint of treatment there is greater advantage in recognizing a classification according to the dominant symptom (Fiessinger), and of studying separately the *cirrhoses with ascites* and the *icteric cirrhoses*, than in taking into account the histologic distribution of a fibrous tissue. As aptly remarked by this author, the value of a field is determined by the nature of the soil and not by the distribution of the stones in it.

As a matter of fact, this classification is nevertheless an approximation of the old pathologic division, for the venous cirrhoses mainly result in the production of ascites, whereas the biliary cirrhoses mainly lead to jaundice.

CIRRHOSES WITH ASCITES (Ascitogenous Cirrhoses).—

There are two main forms of cirrhosis with ascites: *Atrophic cirrhosis*, or Laënnec's cirrhosis, and *hypertrophic cirrhosis*. These are distinguished, in the main, by the following features:

Laënnec's cirrhosis.—Ascites. Small liver. Hepatic insufficiency. Of alcoholic origin.

Hypertrophic cirrhosis.—Ascites less marked and may dry up. Liver enlarged, with slight insufficiency. Sometimes of syphilitic origin.

Treatment of Ascitic Cirrhoses.—**Causal Treatment.**—Combat alcoholism and syphilis. It should be remembered, however, that cirrhotic cases are toxic cases. Specific treatment should, therefore, be used cautiously and interrupted at the first indication of intolerance.

Diet.—Since every cirrhotic patient is being subjected to toxic influences on account of the impaired functioning of the liver, he should necessarily be placed on a milk or lactovegetarian diet.

The exclusive milk diet, or the diet with milk partly replaced by kephyr or yoghurt, is prescribed mainly in the presence of ascites.

The cirrhotic case should not be left on a milk diet too long; there should be rapid progression to the diet of milk and vegetables, which should form the major part of his intake.

Widal and Achard have prescribed the chloride-free diet in cirrhosis with ascites. This procedure has been the source of much discussion, and mention is made of a case of Savy and Francillon, in

which a patient with ascitic cirrhosis recovered on a diet containing an excess of chlorides. It is better to remain on middle ground and allow 6 to 7 grams of salt a day—an amount insufficient to increase the volume of the ascites.

Detoxication Treatment.—There is advantage in placing the patient once weekly on a detoxicating fluid diet; he takes in the course of the day 2 liters (quarts) of strained vegetable broth. A purge is given at the same time (magnesium sulphate or compound tincture of jalap).

Diuretic Medication.—One of the main indications is to act on the circulation and the ascites, which is dependent on the high portal pressure.

With this end in view, one may prescribe:

• ℞ Digitalis,
Ipomœæ,
Scillæāā 0.05 gram (gr. $\frac{1}{4}$).
Ft. pil. No. i. Da tal. No. xxx.
Sig.: Four to six pills a day.

Urea.—Twenty grams (5 drams) a day.

Calomel.—Acts both as diuretic and purgative.

It should be ordered in doses of 0.05 gram ($\frac{3}{4}$ grain) a day for ten days in each month.

Lactose.—Fifty to 100 grams ($1\frac{2}{3}$ to $3\frac{1}{3}$ ounces) in infusions.

Potassium chloride, 8 to 10 grams (2 to $2\frac{1}{2}$ drams) a day, has given good results in the hands of Prof. Blum, of Strasbourg.

Adonis vernalis.—In a tincture; dose, 3 or 4 cubic centimeters (45 to 60 minims).

Medication Intended to Activate the Process of Parenchymatous Repair.—*Hepatic organotherapy* for ten days in every month.

This may be applied by giving either fresh pork's liver, 100 grams ($3\frac{1}{3}$ ounces), chopped up fine, in gruels; or the same material, 200 grams ($6\frac{2}{3}$ ounces) in a maceration in a half-liter of water; or cachets of powdered liver extract, each containing 1 gram (15 grains).

Opothrapy may likewise be practised by the rectal route: Hog's liver, 100 grams ($3\frac{1}{3}$ ounces), is hashed up and macerated in hot salt solution. It is then filtered and given in an enema with 5 or 6 drops of laudanum.

Fibrolitic medication:

Potassium iodide, 2 to 3 grams (30 to 45 grains) a day.

Thiosinamin in hypodermic injections of 0.2 gram (3 grains).

These fibrolitic measures are of doubtful efficacy.

Treatment of Complications (Ascites).—The direct treatment of ascites by *paracentesis* has been dealt with in Part II (q. v.).

At this point consideration of it will be confined to the following features:

Indications for Paracentesis.—Extensive ascites which remains undiminished under diuretic treatment.

Ascites accompanied by pressure symptoms (edema, dyspnea, vomiting).

Contraindications.—An ascites which is not freely movable (movable dullness) should not be tapped; nor should a case with fever or hemorrhage, nor a case with jaundice or hepatic insufficiency (dry tongue, general torpor, urinary evidences).

Procedure.—The point of election for tapping is at the middle of a line extending from the umbilicus to the anterior superior spine of the ilium.

The trocar used should not be too large, in order to avoid unduly abrupt decompression. Only a portion of the fluid should be withdrawn.

OTHER TREATMENTS OF ASCITES.—1. Treatment with ascitic fluid. From 15 to 20 cubic centimeters ($\frac{1}{2}$ to $\frac{2}{3}$ ounce) of the ascitic fluid is withdrawn and at once injected into the cellular tissue. This procedure is to be repeated daily.

2. Surgical drainage of the peritoneum.

Such procedures have been given up on account of the sensitiveness of the cirrhotic patient to anesthetic and operative work.

3. Injections into the peritoneal cavity.

Iodine solution: Tincture of iodine (10 per cent.), 5.5 grams (110 minims); potassium iodide, 2 grams (30 grains), in 1 liter (34 fluid-ounces) of water.

Adrenalin: 2 to 5 cubic centimeters (32 to 80 minims) of a 1:500 solution.

In using adrenalin, a simple exploratory puncture is made and the drug solution injected through the same needle. This procedure could be repeated during about eight days.

Injection of hot boiled water (Castaigne). After the tapping, 4 to 6 liters (quarts) of boiled water at a temperature of 45° C. (113° F.) are introduced, then withdrawn half an hour later, thus effecting a kind of physiologic lavage.

It is in the cases of cirrhosis with large liver that disappearance of the ascites and even actual recoveries may be witnessed.

These cases of ascites are curable because they are often of tuberculous nature and from this viewpoint are allied to the tuberculous peritonitis with ascites of young girls.

They may also be curable through being of syphilitic origin. Letulle showed that out of 154 cases of alcoholic cirrhosis, 74 had a positive Wassermann reaction; hence the need of placing these patients under systematic and prolonged specific treatment.

HYPERTROPHIC CIRRHOSES WITH JAUNDICE.—In connection with the treatment, the following features of the condition should be borne in mind:

Jaundice. Liver enlarged. Spleen enlarged. Absence of ascites and of collateral circulation. Frequently of syphilitic origin.

Treatment of Cirrhoses with Jaundice.—**CAUSAL TREATMENT.**—The most important causal treatment is that relating to syphilis. This treatment should be carried out very cautiously; mercury is to be preferred to neoarsphenamin, which is itself a possible cause of jaundice.

The ideal treatment appears to be that with mercurial suppositories, the mercury absorbed by the rectal route being brought by the portal vein directly to the diseased area.

DIET.—The diet should be strict and planned for its influence on the jaundice; it should consist at first of milk (2 to 3 liters), particularly skimmed milk.

A diet of milk and vegetables should be reached gradually.

White meats and lean fish should be allowed only in the event of distinct improvement.

MEDICINAL TREATMENT.—This has for its purpose to promote biliary antiseptis:

Methenamine, 1.5 grams (23 grains) in three cachets.

Calomel, 0.15 to 0.2 gram ($2\frac{1}{2}$ to 3 grains) once weekly.

METABOLIC DISEASES.

GENERAL CONSIDERATIONS ON THE METABOLIC DISEASES.

The so-called metabolic disorders confront the clinician with a problem that is well-nigh insoluble at the present time. If one accepts the very general, comprehensive conception of the bradytrophic diatheses, of sluggish metabolism, of "neuro-arthritis," etc., the field encompassed is so vast that two-thirds of internal medicine would appear to be absorbed in it. From the utilitarian standpoint, this conception leads to the approximation, if not the coalescence, of clinical states as diverse as obesity, gout, diabetes, cholelithiasis and nephrolithiasis, various degenerative conditions of the viscera, etc. There is a twofold drawback to this conception: Obesity and glycosuria are undoubtedly symptomatic manifestations of very variable pathogenesis; a still greater drawback is that of combining these two conditions in a single description which tends toward the justification of a mistakenly identical treatment. The same is partly true of the different forms of lithiasis. Accordingly, it has seemed more rational to transfer cholelithiasis more specifically to the section on *Diseases of the Liver*; nephrolithiasis, to that on *Diseases of the Kidneys*; the treatment of obesity, to Part III, on the *Symptoms*, etc. In the present section there have been retained only GOUT, a clinical condition *so far, apparently at least*, clearly defined and determinate, and after much hesitation, DIABETES, although, in my opinion, the treatment of this condition should logically be described in the symptomatic section on *Glycosuria*.

GOUT.

Treatment of gout is called for:

(a) Either on account of an ordinary, typical, acute joint attack.
Treatment of the gouty attack.

(b) Or apart from the attacks. *Treatment of the gouty diathesis in general.* This treatment has to be adapted for the different clinical forms: *Gastro-hepatic and pancreatico-intestinal form; angionephritic form; trophoneurotic form, and saturnine gout.*

(c) Or on account of *visceral localizations* or *morbid combinations*, as with nephrolithiasis, diabetes, obesity or albuminuria.

TREATMENT OF THE GOUTY ATTACK.—In an acute gouty attack, it is much more important to know what not to do than to know what should be done.

What not to do.—One should not attempt to check abruptly an acute gouty attack by active, severe medication, internal or external—for two reasons.

The first of these is that, upon due consideration of all related facts, the acute attack of gout appears to be a salutary attack of precipitation of uric acid at some point in the system where this precipitation gives rise to painful, but by no means dangerous, manifestations, and that abortive medication may divert this uratic discharge to internal organs and lead to serious manifestations of retrocedent gout.

The second is that the acute attack is followed by a relief for the patient, or euphoria, which is not experienced to a comparable extent by the gouty patient who has been inopportunistically rid of the salutary attack by active medication. *Sane dolendum est*, already wrote Sydenham.

This view was that of all the older great clinicians: Sydenham, particularly qualified by reason of his own inveterate gout; Cullen, whose celebrated aphorism, "flannel and patience," has been handed down to posterity; Todd, and Trousseau, who wrote literally: "At the beginning of my practical work I attempted like many others to combat the disease; now I stay with my arms folded; I do absolutely nothing for attacks of acute gout, especially when the patient is already of advanced age." This was likewise the view of Garrod, Charcot and Bouchard.

Accordingly, the patient *should not be bled*, as bleeding predisposes to the manifestations of retrocedent gout. Local bleeding by means of leeches or wet cupping is frowned upon by the majority of clinicians. I must admit, however, having seen an attack definitely cut short, without any untoward results, following a free incision which a distinguished surgeon had made in the belief that he was dealing with an abscess.

The patient *should not be purged*, at least not violently, by the use of drastics, as such a disturbing intestinal derivation may lead to a serious oliguria through the diversion of water and uric acid. Sydenham laid particular stress on the nature of such a gouty diarrhea. It would seem, however, that the use of laxatives, or even of cholagogue purgatives in moderate doses, would be an advisable procedure.

The joints *should not be traumatized* by rubbing or massage—which, as a matter of fact, is usually intolerable, local sensitiveness being so greatly increased during the attacks.

No local refrigerant applications should be made; their effect would be *nil* or extremely evanescent, and they would expose the patient to the harmful effects of derivation, already referred to.

Yet—however skeptical one may profess to be regarding the efficacy of given modes of treatment, and whatever reservations may and must be made concerning the utility and drawbacks of certain measures—expectant treatment is rendered the more impossible in these cases by reason of the extremely painful nature of the disturbance; the fact that it may recur for several days or even several weeks in broadsides in some paroxysmal forms; the fact that the patients are generally “epicures” of only mediocre “stoic” qualities, and lastly, the fact that there exist some drugs of unquestionable sedative utility—drugs with which the patients are usually familiar, which they will use independently of the medical man, or even in spite of his recommendation to the contrary, and the use of which, therefore, it is best for him to regulate himself.

The aim should thus be, in the first place, to afford the maximum amount of relief with the minimum of risk; the attendant must, accordingly, know *what to do*.

What to do.—The *affected joint should be protected* against all blows and exposure to cold by being wrapped in a sufficiently thick cotton dressing. The limb should be placed in good position, shielded from the weight of the sheets and blankets by a hoop, if the patient is in bed, or comfortably disposed on a footstool or cushion, if the patient is on an armchair.

One should order *gently applied* over the affected area one of the many available *sedative liniments*, e.g.:

R Extracti belladonnæ,			
Camphoræ	āā	4 grams (ʒi);	
Tincturæ opii	12 c.c.	(fʒiij);	
Olei hyoscyami	150 c.c.	(fʒv).	

M. Sig.: For external use. Apply warm, and renew three or four times a day.

R Extracti belladonnæ,			
Extracti hyoscyami	āā	0.5 gram (gr. viiss);	
Tincturæ opii crocatæ (N.F.)	6 c.c.	(fʒiiss);	
Olei hyoscyami compositi (N.F.)	20 c.c.	(fʒv).	

M. Sig.: For external use (as above).

Methyl salicylate may be combined with such agents, as in the following formulas:

℞ Methylis salicylatis,

Olei hyoscyamiāā q. s.

M. Sig.: For external use. Apply one to two teaspoonfuls over the affected joint, cover with cotton and oiled silk, and fix with a soft, elastic bandage (flannel or crêpe).

℞ Methylis salicylatis,

Tincturæ opii crocatæ (N.F.),

Olei hyoscyami compositi (N.F.)āā q. s.

M. Sig.: For external use (as above).

It would appear that chloroform, ether, guaiacol and all highly volatile substances which are capable of producing a cooling effect by evaporation should be excluded from the formulas of gout liniments.

Menthol, however, combined with chloral hydrate and natural methyl salicylate (oil of betula), forms the basis of betulol, a rather effective preparation; each cubic centimeter of this contains an amount of methyl salicylate corresponding to 1 gram of sodium salicylate.

The urinary flow should be watched and, if necessary, stimulated.—This is a feature of capital importance. It may be almost positively asserted that any gouty case that is urinating copiously is almost certainly protected against the manifestations of retrocedent gout.

The patient should accordingly be restricted to pure water, diuretic mineral waters, lemonade, infusions, etc., to the amount of 2 to 3 liters a day if the condition of the kidneys permits.

Later, the milk or fruit diet should be substituted, then the moderate mixed diet to be described further on.

If the urine is scanty and shows deposits, one might prescribe:

Either *squill*, combined, for example, with potassium nitrate or calomel:

℞ Scillæ pulveris 0.2 gram (gr. iij);

Hydrargyri chloridi mitis 0.05 gram (gr. $\frac{1}{4}$).

Pone in caps. No. i. Da tal. No. xx.

Sig.: Two to four capsules a day, with a cupful of infusion of ash leaves sweetened with lactose.

℞ Lactosi 40 grams (3x);

Scillæ pulveris 4 grams (3j);

Potassii nitratis,

Potassii bitartratisāā 6 grams (3iss);

Olei menthæ piperitæ gtt. vj.

Div. in chart. No. xx.

Sig.: Four to six powders a day in a cupful of infusion of triticum with lactose.

Or *lithium theobrominate* (theobromose, Dumesnil), a soluble preparation which may be given in doses of 0.15 to 0.6 gram ($2\frac{1}{2}$ to 10 grains) a day:

R. Lithii theobrominatis	1.5 gram (gr. xxiiss);
Aquæ menthæ piperitæ	20 c.c. (f3v);
Aquæ	q. s. ad 150 c.c. (f3v).
M. Sig.: One to four tablespoonfuls a day in the 24 hours.	

If the pain, in spite of the above measures, is severe, persistent and lasting, it will necessarily have to be subdued. In practice, the drugs which really exert an analgesic effect in the acute gouty attack are the opiates, sodium salicylate and colchicum.

The majority of clinicians are absolutely opposed to the use of the opiates in gouty cases. Sydenham and Garrod condemned their employment on the ground that the opiates reduce the secretory activities, which should, on the contrary, be promoted in gout. Todd, Trousdale, Charcot and Bouchard likewise objected to their use, and reported having witnessed serious manifestations, generally of uremic nature, in gouty patients after the use of Dover's powder, extract of opium, or morphine.

In my opinion, they should be abstained from in all the cases—and they constitute the majority—in which diuresis is imperfect, in which there is a markedly high blood-pressure, or in which the disease is already of long standing and renal lesions are certain to exist.

If, on the other hand, in conjunction with severe, persistent pain, there is observed intense diuresis (output, specific gravity, chloride content, etc.), with a moderately high systolic blood-pressure (below 180 mm. Hg), the patient should not be refused the comfort attending the injection of a small amount of morphine (0.01 gram— $\frac{1}{80}$ grain); only if diuresis is not unfavorably influenced by this injection should consent be given for a second injection.

In short, the opiates should, as a general rule, be abstained from in gout; only very exceptionally should an injection of morphine be allowed when there is severe, refractory pain, and only if there is free diuresis and the blood-pressure is moderate (below 180 mm.).

These considerations apply with even greater force to all the synthetic analgesics (acetanilid, acetphenetidin, antipyrin, exalgin, pyramidon, etc.), the analgesic effect of which, moreover, is but mediocre in these cases.

If the joint hyperemia is intense and persistent, it is necessary to try to reduce it, and in this event the attendant has at his disposal the salicylates and colchicum, which have a bad reputation—and justifiably so—among medical men, but which exert an unquestionable résolvent action on the hyperemia and pain.

Sodium salicylate in the daily amount of 3 or 4 grams (45 to 60 grains) is remarkably effective against the gouty attack, especially during its

period of decline; its use is, however, certainly not free from drawbacks where the heart or kidneys are diseased and elimination is delayed and incomplete. Many serious complications in respect of the heart, kidneys (uremia) and nervous system have been observed after its use in acute gout; even sudden or rapid death have, with more or less justification, been ascribed to it.

Yet, if the myocardium is robust, diuresis normal, and the nervous system not overexcitable, sodium salicylate may, under supervision and in the event of a prolonged attack, be given in the above-mentioned daily doses of 3 or 4 grams in Vichy water.

Colchicum.—Colchicum is the typical example of those drugs particularly active in certain definite clinical conditions which have been handed down to us from an empiricism probably dating back to the remote past, and of which the most recent investigations have not succeeded in working out the mode of curative action.

We know almost nothing of its exact therapeutic effect, just as, indeed, we are only imperfectly familiar with the pathogenetic mechanism of gout. What is certain, however, is that its inhibiting action on gouty pain, and more particularly on the acute gouty attacks, is such that many highly regarded clinicians look upon it as the specific of gout—certainly an exaggerated view, for colchicum does not cure gout and does not even render the attacks less severe nor less frequent, but merely exerts *on the pain and on the gouty attack* a resolvent, sedative effect which is not afforded to an equal degree by any other substance now known. It would, therefore, be more correct to say that *colchicum may be considered as the specific for gouty pain.*

Information regarding the preferable mode of administration of the drug will be found in Part I, section on *Colchicum*.

Outlines of Treatment for the Principal Forms of Gouty Attack.—Applying the foregoing considerations to a few typical clinical cases, we obtain the following outlines of treatment:

I. ATTACK OF TYPICAL ACUTE ARTICULAR GOUT, NOT PROLONGED AND WITH NORMAL DIURESIS.

1. Rest in bed or on an armchair or couch in a well-ventilated room, of even and moderately high temperature, with the affected member shielded from the weight of the blankets by a hoop or comfortably disposed on a cushion.

2. A thick cotton dressing, moderately tight. Two or three times a day it should be carefully opened and the affected joint anointed, without rubbing, with the following mixture:

℞ Methylis salicylatis,
Tincturæ opii crocatæ (N. F.),
Olei hyoscyami compositi (N. F.)āā 40 c.c. (f3x).

M. Sig.: For external use. One or two teaspoonfuls to be applied each time; cover with cotton, oiled silk and a bandage.

3. Every three hours, a cupful of milk (250 cubic centimeters, making a total of 1½ liters in the twenty-four hours) with addition of two teaspoonfuls of lactose, to be taken slowly.

In the intervals, a cupful of an infusion of ash leaves (*Fraxinus excelsior*, European ash) sweetened with honey (1 to 1½ liters in the twenty-four hours).

4. In the presence of constipation, one of the following pills on retiring:

℞ Extracti belladonnæ 0.01 gram (⅙ grain);
Phenolphthaleini 0.2 gram (gr. iiij).

Ft. pil. No. i. Da tal. No. x.

II. ATTACK OF TYPICAL ACUTE ARTICULAR GOUT WITH SCANTY URINE OF HIGH SPECIFIC GRAVITY, WITHOUT HEART WEAKNESS.

1. and 2. As in I.

3. Restriction to water and milk diet, as in I.

The infusion of ash leaves is to be replaced, however, by one of triticum, cherry stems or pyrethrum, and the amount increased to 2 or 2½ liters.

4. Morning and evening, a tablespoonful of the following:

℞ Lithii theobrominatis 1.5 grams (gr. xxiiss);
Syrupi fœniculi (7 per cent.) 45 c.c. (f5iiss);
Aquæ destillatæq. s. ad 150 c.c. (f3v).—M.

5. In the presence of constipation, one of the following pills at night:

℞ Resinæ podophylli 0.05 gram (gr. ¾);
Phenolphthaleini 0.2 gram (gr. iiij).

Ft. pil. No. i. Da tal. No. x.

III. SUBACUTE, PROTRACTED ATTACK OF GOUT IN AN ADULT FREE OF CARDIORENAL INSUFFICIENCY.

1., 2. and 3. As in I.

4. Beginning on the twelfth day, *morning, afternoon and evening*, in an aqueous or hydro-alcoholic vehicle (infusion of cornsilk or diluted Madeira wine), tincture of colchicum seed in the following doses:

The first day 40 to 60 drops;
The second day 60 to 100 "
The third day 100 to 120 "

Or, *morning, noon and evening*, colchicine, as follows:

The first day	granules of 0.0005 gram ($\frac{1}{30}$ grain)	3 in the day;
The second day	$\left\{ \begin{array}{l} 1 \text{ granule in the morning} \dots\dots\dots \\ 2 \text{ " at noon} \dots\dots\dots \\ 1 \text{ " in the evening} \dots\dots\dots \end{array} \right\}$	4 in the day;
The third day	$\left\{ \begin{array}{l} 2 \text{ granules in the morning} \dots\dots\dots \\ 2 \text{ " at noon} \dots\dots\dots \\ 2 \text{ " in the evening} \dots\dots\dots \end{array} \right\}$	6 in the day.

The patient should be kept under careful observation, and the treatment interrupted as soon as there are frequent stools.

LOCAL TREATMENT OF THE JOINT SEQUELÆ.—
EDEMA, STIFFNESS, TOPHI.—The joint sequelæ of the acute or subacute attacks of gout may consist in persistent, edematous swelling of the periarticular tissues, with stiffness of the joint and tendon-sheaths, and tophi, which may offer mechanical hindrance to motion by their size, or, by softening, may give rise to abscesses with chalky sinuses.

Gentle massage, beginning with effleurage and then gradually increased, should be combined with passive movements. Mobilization should be instituted, however, only after the pain and all local heat indicating the persistence of the subacute phenomena have disappeared.

The resulting acceleration of the circulation in the periarticular tissues activates metabolism locally and promotes absorption of the exudate.

The above kinesitherapeutic measures should be combined with *hot douches*.

Thermotherapy and *light therapy* may be availed of with advantage. The local application of light may facilitate the absorption even of large tophi.

The *Dowsing light bath* consists of radiations emanating from special lamps which give off little light but intense heat. These lamps are placed in front of reflectors suitably arranged in a box or double covering with asbestos lining, forming a closed space in which the temperature may rise gradually to 110, 120 and even 150° C.

The *electric light bath* administered with incandescent bulbs gives less heat, but a powerful illumination, and permits of obtaining the same results, due partly to "local insolation," with less intense heat and less risk of burns.

Electrotherapy may also be availed of in the form of *lithium ionization treatment*.

As for the large tophaceous concretions, enucleation of a tophus that has remained unaffected by other measures may be carried out

through an incision, followed by the application of suitable aseptic dressings.

GENERAL HYGIENIC TREATMENT OF GOUT.—All the authors of old, struck by the unsatisfactory results of treatment in connection with gout, expressed their skepticism in a more or less graphic manner.

"All the efforts of Apollo, the physician of the gods, and of his son, the learned Æsculapius, directed against me are vain. In all ages, men have sought to escape from the shafts of my anger. Some make use of the leaves of the plantain, of lettuce, of purslain, of comfrey, etc. They employ *Lemna minor*, the poppy, hyoscyamus, helleborus root, etc. They have recourse to bones, to nerves, etc., and even to the excreta of animals. What metal, what herb juice, etc., do they not bring into play? Some purge themselves with hiera-picra, etc. All these people are madmen, who do nothing but arouse my anger; and so I deal with them without mercy; but to those who undertake nothing against me, I am indulgent and good." (Lucian, *Trago podagra*.)

In a less lyric, but more satyric strain, Lichtenberg, professor at Göttingen, and a contemporary of Sydenham, wrote to one of his gouty friends:

"Procure the handkerchief of a virgin fifty years old who has never thought of marriage. Wash it in the mill-race of a mill in which the flour has never been adulterated. Allow it to dry on the hedge surrounding the garden of a childless Jew. Mark it with ink obtained from the desk of a lawyer who refuses to plead for a wrong cause. Then hand it to a physician who has never killed one of his patients. Let him rub it over the gouty area which is tormenting you, and you shall be cured."

More prosaically, Sydenham wrote at the beginning of his *Treatise on Gout*:

"It will no doubt be thought that it is very difficult and even almost impossible to find out the nature of gout, or that I possess little imagination or wisdom, since, in spite of the observations I have made on the history and the treatment of this disease, I have not been able to cure myself of it in the thirty-four years that I have been suffering from it."

Nowadays, better informed as to the probable pathogenesis of this disorder, we are able, if not to cure it, at least to attenuate its manifestations to a marked extent—in particular, provided the necessary hygienic measures to counteract gout be instituted in childhood.

As a rule, *the gouty subject eats too much, too fast, and foods that are too nourishing.*

That he eats too much—like the majority of his fellows, to be sure—is quite obvious, and all writers agree on this point. *The food allowance of the gouty patient should be below the normal.* It may be considered that for an adult doing a moderate amount of work it should range from 35 to 40 calories per kilogram (2.2 pounds) of body weight, or even less.

That he eats too fast, that he does not masticate sufficiently, and that this mistaken practice is doubly harmful in that it leads to overeating and dyspepsia, is no less evident, and there is no need to dwell on the necessity of reëducation in mastication for gouty patients.

Finally, gouty subjects eat foods that are too nourishing, too rich in nucleins which yield purins, uric acid and cholesterin. They are, ordinarily, carnivorous individuals. The digestive effort required to deal with these abundant and nitrogenous foods leads to the abuse of salt, of spices, and of alcohol. *The diet of the gouty patient should, in a general way, be low in nitrogen and, especially, low in purins, low in cholesterin, in short, low in meats, and low in chlorides* (I do not say chloride-free, as exclusion of salt may lead to serious disturbances of metabolism); alcohol and spices should be practically prohibited.

Foods to be Interdicted.—In the following table the principal foods are grouped according to the reasons for which their use is of dubious propriety in gout:

PURINS. Cholesterin.	ACIDS, OXALIC, . acetic, etc.	PTOMAINS.	HARD TO DIGEST.	IN THE PRES- ENCE OF RENAL INSUFFICIENCY. Chlorides. Nitrogenous components.
Viscera. Liver, kidneys, brains, tripe. Thymus. Young meats (veal, young chicken). Coffee, tea, co- coa. Bread. Legumins. Gelatin. Eggs.	Sorrel. Rhubarb, etc. Vinegar. Pickled meats. Bread.	Game. Preserved meats. Fish. Crustaceans.	Starchy foods. Fats.	Salt. All articles con- taining an ex- cess of nitro- genous com- ponents.

The foregoing considerations are developed in the following list:

DIET FOR THE GOUTY.

Articles Permitted:

Lean soups based on vegetables, flours, or pastes.

Hors-d'œuvre: Lean ham, radishes, oysters.

Meats: Beef, mutton, chicken, turkey, domestic rabbits.

Fish: Sole, whiting, fresh cod.

Eggs: Boiled, fried, omelet (exceptionally).

Vegetables: All, in abundance—except the legumins, which should be used only in moderation, and with the further exception of cabbage, sauer kraut, beets, sorrel, rhubarb, and mushrooms, which should be interdicted.

Allowed: Cereals, pastes (macaroni, etc.), potatoes, rice, chestnuts, cooked salads, tender raw salads, spinach, string beans, chard, celery, leeks, carrots, turnips, artichokes, cauliflower, etc.

Milk, milk products, *fresh cheeses.*

Raw fruits: Strawberries, cherries, apricots, peaches, grapes, figs, oranges, etc.

Cooked fruits: Marmalades, compotes, preserves.

Custards, rice cakes.

Dry cakes.

Beverages: Pure water, spring water of low mineral content, infusions.

All articles not included in the above list are forbidden.

Finally, if, going further into detail and taking into account both the kinds and quantities of foods, we wish to give the patient still more definite data as to the average diet to be followed, we may draw up a list of the following type:

SPECIMEN MENU.

Breakfast.

- (a) Toast (30 grams).
- (b) Infusion (200 c.c.).
- (c) Raw fruit (grapes, peaches, figs) (200 c.c.).
- Or cooked fruit, 1 tablespoonful.
- Or preserves, 1 dessertspoonful.

In the course of the morning.

Water, 250 c.c.

Noon (principal meal).

- (a) Mutton chop or slice of roast or steak.
- Or a wing of a chicken or turkey.
- Or one sole or whiting.
- Or one boiled or fried egg.
- (b) Pastes (macaroni, etc.) or potatoes or rice.
- Or various salads.
- Or leafy vegetables or tomatoes.

SPECIMEN MENU (*continued*).*Noon (continued).*

- (c) Custard.
Or rice cake or mush.
Or fruit, raw, or cooked, or
dried, or preserved.
- (d) Toast (50 grams).
- (e) *Beverage*: Water, 500 c.c.

In the afternoon.

Water, 250 c.c.

Evening meal.

- (a) Lean soup: Vegetable, bread, tapioca, rice, or cereal.
- (b) One egg or one small fish.
- (c) Carrots, or potatoes, or peas, or spinach, or artichokes, or beans.
- (d) Fruit, raw, or cooked, or dried, or preserved.
- (e) Toast (50 grams).
- (f) *Beverage*: Water, 500 c.c.

Gouty patients, for the most part epicures, addicted to the pleasures of the table, submit only with difficulty, aside from the acute attacks, to dietary restrictions that are at all severe. Here again, as under many other circumstances, one must be willing to compromise and not waste time and lose one's authority in insisting on the unattainable. For my part, in the cases in which I am able to secure only partial observance of a strictly antigout diet—and this is the commonest type of case—I endeavor to secure observance of a *strict vegetable diet*, a *milk diet*, or a *fruit diet for two days in each week*. The instructions given are simple: Water, fruits and vegetables *ad libitum* on two days in the week. This proceeding has seemed to me the most advantageous in the majority of my gouty patients. There is no doubt that restriction to water combined with purgation often exerts a favorable effect in these cases (Guelpa).

Kinesitherapy in Gout.—Kinesitherapy may be of considerable utility, both for prophylactic purposes, to prevent the accumulation of wastes and keep the organism in a condition of functional equilibrium, and for curative purposes, to burn up the accumulated wastes and restore the various systems to normal activity. Certain indispensable precautions must be taken, however, otherwise gouty attacks may be brought on. The course of training should be particularly slow and gradual; the gouty patient should not exercise beyond his immediate capacity for it. The treatment may be divided into three stages (Dausset and Bécu).

1. *Stage of preparation*, in which the attempt is made, by courses of diuretic medication, dieting, massage, purgation and by passive movements, to restore normal functioning of the various systems of the body.

2. *Stage of progressive training*, in which the patient's will participates in the treatment (active motion), but with avoidance of all overexertion. The patient should, above all, acquire greater chest capacity, greater muscular surface, greater activity of the skin, and greater neuromuscular tone. The means availed of should consist at first of sauntering, walking, respiratory exercises, Swedish exercises, etc.; later, the use of exercisers, Hébert's natural gymnastics, and lastly, the milder sports. The gouty subject, despite notions to the contrary, should push the exercising until perspiration appears. The urine, pulse-rate, blood-pressure and spirometric readings should be watched.

3. *Stage of neuromuscular equilibrium*, which begins when the patient has undergone sufficient training and is normally resistant to fatigue. To maintain the state of balance thus obtained, he should undertake to perform each day, throughout life, a sufficient amount of physical work, consisting of mild sports or indoor gymnastics.

General massage is useful in the preparatory stage. Local massage and passive gymnastics or mechanotherapy constitute, with diuresis cures, the effective treatment for the chronic joint involvements and the sequelæ of the acute gouty attack.

Similar considerations apply to **mental work**. Here again, idleness as well as overwork must be avoided. Idleness leads to abuse of the enjoyments of a lower order and of high living, while a well-ordered life, with occupational pursuits well adjusted to the individual capacities, constitutes the best remedy for these very common tendencies in gouty subjects. Mental overwork is likewise to be avoided. Sydenham's misadventure in this connection is well-known; his most severe attack was brought on by the overwork attending the preparation of his *Treatise on Gout*. Lécorché had his first attack of gout following overwork.

In short, the gouty patient should, insofar as is possible, lead a well-ordered, well-occupied, well-balanced life, with careful adjustment of his activities with a view to the avoidance alike of idleness and of mental overwork, of an unduly sedentary occupation and of excessive physical activity. The division of the day into three equal parts of eight hours each would, in general, suit him perfectly: Eight to ten hours devoted to his occupation, eight hours of sleep, and six or eight hours of distraction and physical exercise, including at least three hours of walking.

Needless to state, this scheme of treatment is not intended to be more than an approximate guide, to be adapted to the requirements of the individual case.

Special care should be taken in the **hygiene of the skin**.

A daily rub should be given, either dry with the hair-mit, or with alcohol (eau de Cologne), or with a stimulating liniment of the following type:

℞ Spiritus lavandulæ (2 per cent. oil),	
Spiritus rosmarini,	
Alcoholis	āā 100 c.c. (f ₃ ij);
Terebinthinæ (N. F. IV)	15 c.c. (f ₃ ss).
M. Sig.: For external use.	

Tepid hydrotherapy in all its forms may be recommended: Sponge baths, rain or jet douches, tub baths.

Fresh air treatment is just as advisable in gouty cases as in the tuberculous, and the practice of having the window open day and night just as rational, provided, however, the customary precautions are carefully taken to avoid undue cooling of the skin.

MEDICINAL TREATMENT OF THE GOUTY DIATHESIS.

—The diuretic procedure for uric acid elimination which is most to be recommended is clearly the regular ingestion, between meals, of a definite amount of *pure water* or of one of the *mineral waters of very low mineral content*.

The best time for the taking of this water appears to me to be in the *morning* on an empty stomach, or an hour before the noon meal and in the *evening* on retiring.

The *average daily quantity* of one-half bottle may be increased to one bottle in the event of scanty urine of high specific gravity and with a tendency to the formation of deposits. A yearly cure at one of the resorts affording waters of low mineral content may be recommended.

The special waters may be partly or temporarily replaced by infusions of (European) ash leaves, cherry stems, cornsilk, triticum, pyrethrum, etc., which should be taken at the times already mentioned with the addition, if need be, of lactose.

The *alkalies* enjoy, in the treatment of gout, a well-established reputation, which cannot be upset by the recent investigations tending to deny sodium bicarbonate all eliminant value (Fauvel, Luff, etc.). The clinical observations are these: Vichy (sodium bicarbonate), Carlsbad and Marienbad (magnesium salts) and Vittel and Contrexéville (lime salts) unquestionably exert on gout a favorable effect, produced, in truth, in some complex and as yet incompletely elucidated manner (diuresis, eliminant action, modification of blood alkalinity or of the uricopoietic digestive functions, formation of relatively soluble neutral alkali urates, etc.). In short, the use of alkalies appears to be deserving of recommendation in some phases of gout, but actually, it requires supervision through systematic

analysis, including frequent determinations of the urinary acidity, which partially reflects the acidity of the tissue fluids.

At any rate, the uricologic investigations of Joulie and the therapeutic results obtained by Falkenstein have demonstrated that not all arthritic and gouty subjects show excessive acidity of the body fluids, but that some subjects, especially in the atonic forms, show reduced acidity and should consequently not receive alkalies. I have described elsewhere (see "*Clinical Diagnosis*") an extremely simple and rapid procedure for the determination of this acidity which will enable the observer to avoid prescribing alkalies when they are not indicated.

In France, preference is generally given to sodium bicarbonate in a dosage of 2 to 3 grams (30 to 45 grains) a day (one-half to one bottle of Vichy water, Grande-Grille or Hôpital). As previously mentioned, this administration of Vichy water should be *gradual* (increased from one wineglassful to one-half bottle or more), in two or three divided amounts, *viz.*, on the empty stomach and one hour before the noon and evening meals. It should also be *temporary*, *i.e.*, prescribed only about ten days in each month, and should be *controlled* by systematic determinations of the urinary acidity.

Mention should be made, after the above reference to alkaline medication, of the acid medication advocated by Falkenstein (hydrochloric acid), by Joulie, Cautru and Martinet (phosphoric acid), and by various other observers, in the form of lemon juice, citric acid, or acidulated drinks (Guelpa).

Falkenstein, indeed, asserts that he witnessed extremely favorable results from the prolonged use of stronger hydrochloric acid taken with the meals in carbonated water in doses of 20 to 60 *drops* a day, and has concluded from this that gout is dependent upon an inherited gastric hypochlorhydria. Le Gendre endorses this measure in some cases.

Joulie, on the other hand, himself an inveterate sufferer from gout, having noticed that, in contrast to the accepted theories, he was hypoacid (following prolonged alkaline treatment, to be sure), treated himself by phosphoric medication and obtained therefrom most gratifying results. Phosphoric medication undoubtedly is of appreciable service in long standing cases of gout that are atonic, debilitated and hypoacid. One may prescribe:

℞ Acidi phosphorici diluti	50 c.c.	(℥3xiiiiss);
Sodii biphosphatis	20 grams	(3v);
Aquæ destillatæ	160 c.c.	(℥3vss).

M. Sig.: Three to six teaspoonfuls a day with the meals.

(MARTINET.)

This simple presentation of two therapeutic procedures apparently so diametrically opposite and each supported by a number of clinical observations plainly shows: 1. How incomplete and obscure our theoretic conceptions of the pathogenesis of gout still are. 2. That gout does not present itself to the clinician in but a single form, but in varying and diverse forms which it is incumbent on him to distinguish. There occur, in particular, hyperacid gouty cases with uricemia and hypoacid gouty cases with oxalemia and "calcemic" phosphatemia; it is thus quite plain that alkaline and acid medications may be useful in certain cases, but that it is irrational to apply either the one or the other systematically in all instances.

One might be expected next to enumerate the lengthy group of the *uricolytic* agents, the solvent action of which, while well known to occur *in vitro* in most instances, is far less certain clinically. I shall merely mention the agents the use of which has become customary on the basis of clinical experience.

In the front rank of these are to be placed the *salicylates* and *benzoates*.

The *salicylates* (see Part I) may be definitely recommended in the treatment of gout, principally in the period of decline of the acute attacks.

The *benzoates* share the properties of the salicylates, but are less active, less strongly sedative, though also less severe in action. They may be prescribed in the subacute and chronic stages, in combination with some diuretic preparation:

℞ Sodii benzoatis	5 grams (gr. lxxv);
Oxymellis scillæ (N. F.)	20 c.c. (f3v);
Syrupi fœniculi (7 per cent.)	60 c.c. (f3ij);
Aquæ destillatæ	q. s. ad 150 c.c. (f3v).

M. Sig.: Tablespoonful doses every two hours.

In gout *lithium benzoate* is much used. It has been credited, in common with the other salts of lithium (carbonate and salicylate), with a solvent action on uric acid.

In the *subacute* manifestations one might prescribe:

℞ Lithii benzoatis (N. F.),	
Acidi acetylsalicylici,	
Magnesii oxidi	āā 0.25 gram (gr. iv).

Pone in cachet. No. i. Da tal. No. xx.

Sig.: Four to eight cachets a day.

The following combination is more especially to be recommended in the *acute* attacks:

℞ Lithii carbonatis (N. F.)	0.25 gram (gr. iv);
Amidopyrinæ	0.15 gram (gr. iiss);
Colchici pulveris	0.05 gram (gr. ¼).

Pone in cachet. No. i. Da tal. No. xx.

Sig.: Three to six cachets a day.

Mixture:

℞ Lithii benzoatis (N. F.)	5 grams (gr. lxxv);
Sodii salicylatis	10 grams (3iiss);
Syrupi fœniculi (7 per cent.)	75 c.c. (f3iiss);
Aquæ menthæ piperitæ,	
Aquæ destillatæ	āā 120 c.c. (f3iv).

M. Sig.: Three to six tablespoonfuls a day.

Effervescent powder:

℞ Lithii carbonatis (N. F.)	2 grams (3ss);
Sodii bicarbonatis	5 grams (gr. lxxv);
Acidi citrici	4 grams (3j).

Pone in chart. No. x.

Sig.: Two to six powders a day in a little water (POUCHET).

In general, the lithium preparations may be given either in the stage of decline of the acute attacks, or systematically, for ten to fifteen days in each month, independently of the attacks, for preventive purposes. In the acute or subacute periods, they should be combined with analgesics of the type of acetylsalicylic acid or pyramidon, as already illustrated; aside from these periods, if diuresis is insufficient they should be combined with diuretics, such as oxymel of squill or theobromine. One of the preparations which has given me the most constant results is *lithium theobrominate* (Dumesnil) in the daily amount of 0.3 to 0.5 gram (6 to 7½ grains) in a 1 per cent. solution in distilled water, of which two to four tablespoonfuls a day are taken.

After the salicylates, benzoates and lithium salts, mention should be made of *piperazin* (diethylene-diamin) and its many derivatives. In general, its real action is as much questioned as that of the lithium salts. Its solvent action *in vitro* is, however, unquestionable.

Piperazin is used in an average dosage of 0.5 to 1 gram (7½ to 15 grains) a day. *Piperazin hydrochloride*, more stable, is used in the same dosage.

Piperazin citrosalicylate (urazin) combines in approximately equal parts piperazin, salicylic acid and citric acid. This combination is—*a priori*—a judicious one, as each of the components possesses definite therapeutic properties in rheumatism and gout. It is supplied in tablets of 0.3 gram (5 grains) each and in an effervescent preparation containing a like amount of the drug in each teaspoonful. The dose is 0.9 to 2.4 grams (14 to 37 grains) a day.

Turning to an entirely different chemical group, mention should be made of *methenamine* or urotropin, which occurs in colorless, freely soluble crystals with a bitter taste, and is used mainly, as is well known, as an urinary antiseptic. It has been recommended for preventive purposes in gout in doses of 0.5 gram (7½ grains)

two or three times a day in a half-liter of water, but it should be clearly realized that its prolonged use is not without drawbacks and exposes the patient to gastro-intestinal irritation, hematuria, albuminuria, urticarial eruptions, headache, dizziness, etc.

In still another chemical group is the newest and, perhaps, the most interesting of the uric acid solvents, *viz.*, *thyminic acid* (nuclein-phosphoric acid or soluro), which occurs in the form of a yellow-brown, almost tasteless powder, soluble in cold water, the solvent action of which on uric acid is pronounced *in vitro* and seems to have been well demonstrated *in vivo*. Clinically, it is one of the preparations from which I have obtained the most constant results, at least in uric acid gravel. It should be used in daily doses of 0.5 to 0.75 gram ($7\frac{1}{2}$ to 12 grains) in powders, tablets, cachets, or granular form, in three doses during or after meals.

The above enumeration might—with little profit—be continued with the mention of various substances such as quinic acid, urotropin quinate, citrophen, formural, lithiopiperazin, lithium citroquininate, lithium vanadate, uraseptin, saliformin, uricedin, urolysin, etc., which, variously combined among themselves or with the foregoing drugs, make up an almost interminable list.

This apparent pharmacologic wealth conceals at bottom an actual pharmacodynamic poverty; for it is precisely because there is not now known any true, recognized, unquestionable, specific remedy for the gouty diathesis that so many agents are commercially provided. Most of them have as sole recommendation their solvent action on uric acid *in vitro*; it is well to note, moreover, that with many of them the presence of even a small amount of sodium chloride in the test-tube is sufficient to check all solvent action, and all the more so when one is performing the tests, as did Luff, in the presence of blood serum.

The regulation and even the stimulation of the functions of the liver and intestine is essential, as is clinically obvious, in all the metabolic diseases, and more particularly in gout. The *laxatives* (cascara, frangula) and even the *cathartics* (aloes, rhubarb, bryonia, etc.) should be systematically employed, continuously or intermittently.

* TYPICAL LIST OF THERAPEUTIC INSTRUCTIONS IN CHRONIC GOUT.

I.—General Hygienic Measures:

1. Reduced diet (see diet list previously given), with meat, fowl or fish at one meal only; use little salt, no spices.

Eat but little and eat slowly, masticating thoroughly.

For two days in each week: A strictly vegetarian diet, omitting leguminous vegetables—if need be, a milk and vegetable diet, or better, a fruit diet.

No tobacco nor alcohol.

2. Remain in bed at most eight hours.—Work eight to ten hours.

Devote at least four hours a day to physical exercise in the open air: Walking, horseback riding, bicycle riding, hunting, gymnastics, fencing, rowing, tennis, etc.

Get accustomed to having the windows open day and night, adopting the necessary precautions to avoid undue exposure.

3. Each morning, a lukewarm sponge bath followed by a rub with:

℞ Spiritus lavandulæ (2 per cent.),	
Spiritus rosmarini,	
Alcoholis	āā 60 c.c. (fʒij);
Terebinthinæ laricis	9 c.c. (fʒiiss).

M. Sig.: For external use.

At least twice weekly: An alkaline, tepid bath of twenty minutes' duration, followed or preceded by a general rub or even a good general treatment by deep massage and pétrissage.

4. Take regularly *on retiring* and *on awaking* a large tumblerful (200 to 250 cubic centimeters—6 to 8 ounces) of pure water, a diuretic infusion (European ash leaves, pyrethrum or cherry stems) or a mineral water of low mineral content.

II.—*Medicinal Treatment:*

5. For ten to fifteen days in each month, the daily amount of diuretic water is to be increased to one bottle—by taking an additional drink in the course of the morning and in the afternoon—and with two of these drinks, one of the following remedies taken:

Either a tablet of soluroi (thyminic acid), 0.25 gram (4 grains).

Or a tablespoonful of a solution of lithium theobrominate containing 0.15 gram (2½ grains) per tablespoonful.

Or one of the following cachets:

℞ Dimethylpiperazinæ tartratis,	
Methenaminæ	āā 0.25 gram (gr. iv);
Sodii benzoatis	0.5 gram (gr. viiss).
Pone in cachet. No. i. Da tal. No. xx.	

6. Once or twice weekly, on retiring, 0.1 to 0.15 gram (1½ to 2½ grains) of aloes.

III.—*Mineral Water Treatment:*

PHYSICAL AND MINERAL WATER TREATMENTS OF GOUT.—A. Physical Measures.—Much advantage may be derived from systematic *gymnastic exercises*, so planned as to bring into play the largest

possible number of muscles and activate metabolism, without, however, reaching the point of fatigue, which depresses the nervous system and loads the blood stream with wastes.

General massage and *rubs* are serviceable in the majority of gouty cases. Massage of the abdomen should, however, be avoided in gouty subjects with arteriosclerosis.

Tepid hydrotherapeutic procedures or the Scotch douches are, as a rule, very useful in gouty patients still in a flourishing state of general health; but are contraindicated in proximity to the attacks and when there are renal or vascular complications—or at least, they should be very carefully regulated and supervised in such cases. Baths are not always suitable, and their frequency, duration and temperature should be worked out with due consideration to the condition of the major systems of organs.

Delherm summarizes the utility of certain other physical agencies as follows:

"The *general light bath* induces in a few minutes a hyperemia due to a vasodilator effect; this stage is followed by the stage of perspiration, which passes into a more or less marked sweat. There are some patients in whom this sweating is induced only with difficulty; in others, on the contrary, it is brought on easily.

"In gouty subjects, it is this sweating, as copious as possible, which one should endeavor to obtain. In those who follow the prescribed dietary régime, one can thus reduce the body weight and, by promoting elimination through the skin, rid the system of a certain amount of toxic materials.

"The *high frequency currents*, applied over the whole body, have also been employed on account of the physiologic changes they are capable of producing in the system. It is recognized, indeed, that these currents exert on the respiratory changes an effect which is manifested by an increase in the expired carbon dioxide. It is also known, through Tripet and Guillaume, that high frequency increases the activity of oxyhemoglobin reduction in patients with sluggish metabolism. D'Arsonval's experiments indicate that the heat liberated by the body rises to almost double the normal amount.

"Apostoli and Berlioz, Desnoyes, Martre and Rouvière have concluded from their very numerous experiments that high frequency increases the amount of uric acid, the total nitrogen, the urinary nitrogen ratio, and the phosphates and chlorides eliminated; accordingly, Guilloz has regularly subjected his gouty patients to high frequency treatment by autoconduction or autocondensation with asserted good results."

There is no doubt reason to base some hopes on the treatment of gout by *radium*. But in spite of numerous investigations the question has not as yet emerged from the empiric stage.

B. Treatment by Mineral Waters.—In the selection of a resort to be visited by a gouty patient, I begin by taking into account the opinion I have formed of the pathogenesis in the individual case.

I.—It must be recognized that, as one group of gouty cases is connected with a **primary functional disorder of the digestive glands** (liver, pancreas, stomach, intestine), the interests of those belonging to this group may best be served by the waters which, in some way or another, are capable of improving the functions of the digestive organs—resorts of the type of Vichy, Carlsbad, Vals, Pougues, Châtel-Guyon, Wiesbaden, Kissingen, etc.

Among these cases should be set apart those who are more particularly *dyspeptic heavy eaters with gastric and hepatic disturbances*, in which event Vichy, Carlsbad or Pougues are suitable.

If there is *constipation*, with *evidences of abdominal plethora*, Châtel-Guyon, Brides, Carlsbad, Marienbad or Kissingen would be especially serviceable.

II.—Among the gouty patients of the **angionephritic type**, those exhibiting manifest *renal insufficiency* could go to resorts of the type of Vittel, Contrexéville, Martigny or Évian. Those with *high blood-pressure* could go to Vittel or Royat.

III.—Gouty cases of the **neuropathic type** should be directed to the resorts affording sedative waters of the type of Nérès, Plombières, Bagnères-de-Bigorre and Ragatz.

* * *

These general indications are, however, subject to a consideration of the *existing or recent disease manifestations* in each particular case.

In the first place, a gouty patient should not be referred to a watering resort unless the joint attack has passed the acute stage and, likewise, the subacute stage. One may, however, send to the springs a gouty subject who still has swollen and painful joints two months after an attack. Activation of diuresis may thereupon complete the local ameliorative process. The eliminant, calcium, sulphate waters may be availed of in this connection.

Where all pain has disappeared, if *altered shape of the joints* due to remains of exudate, or *muscular stiffness*, remains, the case may be sent to a resort such as Aix-les-Bains, with its sulphur waters, where the "douche-massage" procedure will gradually restore free joint mobility.

When a gouty patient exhibits *impairment of general health* as a result of frequent attacks, with loss of weight, pallor, reduced appetite, and diminished output of urine and of uric acid, resorts of the type of Royat and Ems (sodium bicarbonate and chloride waters) or of Châtel-Guyon, Homburg, Wiesbaden and Kreuznach

(sodium chloride waters) may be visited; or, if there is definite anemia and a progressive tendency to gouty cachexia, the resorts with iron waters may be availed of.

If there is present actual *interstitial nephritis*, no visit to a watering place should be made, or one of the waters of low mineral content, such as Évian, used.

Often, in gouty cases, there are present *a number of different indications* in combination. Under such circumstances *two cures* at different resorts are sometimes taken in the same summer, with an intervening period of rest in the mountains.

TREATMENT OF THE DIFFERENT CLINICAL FORMS OF GOUT.

- (a) *Gastro-hepatic and pancreatico-intestinal form.*
- (b) *Angionephritic form.*
- (c) *Trophoneurotic or neuropathic form.*
- (d) *Saturnine form.*

A. Gastro-hepato-intestinal Form.—It is to the patients suffering from this form of gout that the classic precepts relating to the drawbacks of overeating, whatever be the nature of the foods taken, are particularly applicable. The daily allowance should be cut down to 30 calories per kilogram (2.2 pounds) of body weight. Petrarch's admonition: "If thou wishest to be protected from gout, thou must be poor or live poorly," is most suitable in this class of case.

The principal aim in the diet should be to avoid upsetting the functional balance of the digestive tract, and at the same time restrict the ingestion of purin-yielding substances and meats.

A gouty subject with **hyperchlorhydria** will not tolerate starchy foods well.

For the patient suffering from **motor atony of the stomach**, the leafy vegetables and raw fruits cannot be suitable, and it would be a poor policy to cut him down to a vegetable diet. He should rather be allowed a certain amount of choice from among the meats, fowl and fish, provided, however, that the flesh of the articles selected is lean, very fresh, simply prepared and used in moderation. Especially to be frowned upon is an elaborate cuisine, always introducing the use of spices and condiments. It has been definitely proven that the flesh of young animals is relatively rich in nucleins, and a gouty case of the "digestive" type should therefore not be advised to take young chicken, lamb and veal, in accordance with a notion still too widely prevalent.

In gout of the **hepatic type**, the fats should be adjusted like the meats: Fresh eggs, skimmed milk, fresh cheeses, starches, leafy vegetables, sugar and fruits should make up the greater part of the diet.

When intestinal digestion is defective, and examination of the stools—very necessary to show the degree of digestive utilization of

the food—indicates that the starches and fats are not being well digested, a larger place has to be given to the intake of meat.

Beverages may likewise vary according to the digestive type of the case. No doubt alcoholic beverages and carbonated waters should, in general, be systematically interdicted. But it is not necessary that all gouty cases should drink only water. There are some who can use with discretion light white wines, old Bordeaux and light beers.

In short, a diet moderate as to quantity, low in purins and with meat in moderation, with plain cooking, little in the way of fermented beverages, and especially, a planning of the diet with a view to obtaining the best possible functioning and least overburdening of the several organs concerned with digestion—this is the general rule which appears best adapted for the gastro-hepatic and pancreatico-intestinal form of gout.

When the stomach, well provided with hydrochloric secretion or even exhibiting **hypersecretion**, leads the gouty patient to overeat and exceed his allowances of meat, short alkaline and neutral salt cures are indicated: For ten days in each month he should be caused to take in the morning on an empty stomach and one hour before the meal 100 to 200 cubic centimeters ($3\frac{1}{3}$ to $6\frac{2}{3}$ ounces) of Vichy water to which has been added per bottle (1 liter or quart) 15 to 25 grams ($\frac{1}{2}$ to $\frac{5}{8}$ ounce) of sodium sulphate.

Insufficiency of hydrochloric and peptic secretion calls for the use of a little hydrochloric or phosphoric acid at each meal. Ten drops of the stronger hydrochloric acid [=35 drops of diluted HCl] may be ordered taken at the end or in the middle of each meal, in a half glassful of water.

Or, a glassful of a 0.4 per cent. mixture of stronger hydrochloric acid with water may be used.

Along with the acid may be given the simple bitters, such as tincture of gentian, of calumba, or of bitter orange peel, and the strychnic bitters, nux vomica or ignatia, where there is insufficiency of secretion.

If it is the activity of the **liver** which is deficient, one should prescribe periodically the alkalis and neutral salts in larger doses than in hyperpepsia, together with Carlsbad water and salts in the morning, calomel, euonymin or podophyllin, or extract of oxgall.

In cases in which **deficient digestion of the fats and starches**, as shown by macroscopic and microscopic examination of the feces, points to reduced pancreatic, duodenal or jejunal secretion, pancreatin, pancreatokinase and enterokinase will be useful adjuncts.

B. Angionephritic Form.—One is led to class the gouty subject in this group when he exhibits to a predominant degree the various disturbances of function of the circulatory system: Frequent epistaxis, congestion of the head, cooling of the hands and feet on slight provocation, angiospasm (dead finger phenomenon, partial numbness) and vasodilatation, alternating from trifling causes; frequent diminution of the urinary output, often of low uric acid content, although at other times there appear attacks of gravel with renal colic; high blood-pressure, intermittent albuminuria, gallop rhythm, and disturbances of cutaneous secretion (dry skin or hyperidrosis and seborrhea), dependent, in turn, upon a circulatory and renal defect.

The diet should contain as little meat as possible, and the ideal is, not a vegetable diet, but a diet of milk, eggs, vegetables and fruits:

Let the patients have meat only every other day, once a day, or two days in the week; on the other days, milk, eggs, fats and carbohydrates constitute the diet.

In the periods in which there appear certain symptoms of auto-intoxication (headache, unfitness for work, somnolence or insomnia, etc.), nitrogenous foods should be completely forbidden.

These gouty cases of the angionephritic type must give up fermented beverages and alcohol absolutely; water, milk, infusions and, perhaps, unfermented grape juice are exclusively suitable for them.

They may be allowed coffee, tea and cocoa in moderation.

The elimination of salt should be watched, and salt withdrawn if necessary.

In short, for gouty cases of the angionephritic type, a meatless diet, low in purins, non-alcoholic, chloride-low or chloride-free, consisting principally of milk, eggs and vegetables, is indicated.

Care should also be taken to *maintain regularity of the central and peripheral circulation and to keep up and activate diuresis.*

The cutaneous vasomotors should be stimulated and the eliminatory activity of the sweat-glands brought into action; by regular rubs over the entire body surface, the patient should be hardened against the harmful results of exposure to cold which, by inhibiting the skin functions, frequently induce renal congestion and retention of uric compounds.

C. Neurotrophic or Neuropathic Form.—The third group is that which appears to be the most clearly allied to gouty inheritance of long standing, extending over several generations, as well as the commonest in our time, in which social conditions overtax the nervous system. This form, a division of "neuro-arthritis," is manifested early in life by nervous disturbances: The faulty discipline of the nervous system

inhibits either the action of the ferments on the proteins to be transformed; the functioning of the structures producing these ferments, or the excretory devices of the kidneys and skin.

The dietary régime appears to me of much less importance than in the two preceding categories as regards the selection of meat, fat or carbohydrate allowances.

The nervous type of gouty case should receive a varied régime, low in purins, of course, but in particular, strictly excluding every trace of alcohol and stimulants, which disturb nervous equilibrium.

Lastly, in gouty cases of the neurotrophic type, stress must be laid on the aggregate of the hygienic and therapeutic measures capable of maintaining **nervous balance**; the cerebral and spinal functions and mental, moral and sexual hygiene should all be taken into account.

These patients should be subjected unceasingly to hydrotherapy and treatments by physical agencies. They need the mountains, touring, sea trips and automobile rides.

For the prophylaxis of gout in the offspring of gouty subjects, a plan of education calculated to lower the intensity of the nervous responses is very necessary. In these subjects there should be moderation in all things, physical exercise as well as brain work, strenuous sports as well as distractions which lead to nervous overstimulation, sexual indulgence as well as intensive study or business activity.

D. Saturnine Form.—*The therapeutic indications relating to the angionephritic group are applicable likewise to the gouty cases originating from lead, after removal of the occupational or casual toxic cause.*

TREATMENT OF THE ABARTICULAR INVOLVEMENTS, COMPLICATIONS AND MORBID ASSOCIATIONS OF GOUT.

One should distinguish, as suggested by Lécorché:

1. The disturbances that are due to pathologic or mechanical lesions directly or indirectly of gouty nature. 2. Those which are mere functional vasomotor disturbances (angiospasm or hyperemic states), nervous disturbances (hyperesthesia, contractures), or arrhythmias induced directly by gout. 3. Disturbances that may be simply coincidental, the result of dietary indiscretions, of toxic states or secondary infections, or of neurasthenia or hysteria.

The disturbances calling for the use of colchicum are only those which are both purely functional and essentially gouty in nature. This drug is powerless against actual lesions or mechanical disturbances, even when of gouty nature, as well as against functional disturbances dependent upon some other factor coexisting in the gouty patient. Indeed, in doubtful

cases, it is upon the efficacy of colchicum that an affirmation of the gouty nature of a symptom may be based.

For my part, I have seen neuralgias, headaches, eye disturbances, tinnitus aurium, vertigo, hiccup, asthmatic dyspneic seizures, delirium and insomnia, which had remained uninfluenced by ordinary measures, yield rapidly to the administration of colchicum.

Mention may be made of certain *digestive manifestations* of gout:

Pain (gouty gastralgia or cardialgia), occurring independently of hyperchlorhydria, may be a simple hyperesthesia. It should be combatted with bismuth subnitrate or subcarbonate in large doses—10 grams (2½ drams) in a glass of water one to three times a day,—prepared chalk combined with sodium bicarbonate and magnesia, with antispasmodics such as belladonna and the opiates (always watching the renal permeability), or with stovaine. For example:

℞ Stovainæ	0.1 gram (gr. iss);
Tincturæ belladonnæ	4.5 c.c. (℥℥ss);
Tincturæ opii camphoratæ	4 c.c. (fʒj);
Aquæ tiliaë	95 c.c. (fʒxxv).

M. Sig.: Two tablespoonfuls in a half-glassful of sweetened water.

Hot applications to the epigastrium.

Flatulence is often due to rapid eating and aërophagia, which may be obviated by suitable instructions to the patient as to the mode of eating and the precautions to be taken to avoid swallowing air during the period of digestion. If this measure fails, the strychnic drugs, carminatives, massage over the stomach and abdominal faradization will prove the best remedies.

The **spasmodic syndrome**, which may lead either to esophagism and cardiospasm, or to gastrospasm with repeated vomiting (treated with Rivière's solution, sodium citrate and ice), or to gastric stasis, should be met with antispasmodics given by the rectum:

℞ Valerianæ pulveris	10 grams (ʒiiss);
Aquæ bullientis	200 c.c. (fʒviss).
Fac infusum, filtra et adde:	
Potassii bromidi	3 grams (gr. xlv);
Tincturæ opii	gtt. xx.

Sig.: To be used warm as an enema.

To these spasmodic conditions is often superadded obstinate *hiccup*, which may yield only to injections of morphine (if the condition of the kidneys permits).

The **catarrhal syndrome** comprises an excessive secretion of gastric mucus with anorexia, coated tongue and retching. The treatment consists of restriction of food; the administration of bitters, alkalies and ipecac, and, if need be, gastric lavage.

The manifestations referable to the **respiratory tract** include acute **gouty sore throat**, easily recognizable by its objective features (special type of redness, pain). The treatment is practically limited to gargling and spraying with alkaline, salicylate and cocaine solutions, hot moist applications about the neck and mustard foot-baths; the condition disappears if joint involvement occurs.

Chronic nasopharyngitis calls for local and general hygienic measures and thermal cures.

Asthma is sometimes cut short by colchicum. In congestion of the bronchi and lungs, revulsive measures (cupping, mustard applications and wet packs), quinine and ergot in fractional doses may be very useful.

In respect of disturbances of the **circulatory system** one is called upon to ascertain what symptoms are ascribable to excessive fat deposition in obese gouty cases, to the reflexes of dyspeptic and hepatic patients, to gouty myocarditis and to the syndrome of angina pectoris.

The **gouty heart** may, in addition to rest, call for the heart-tonics if the blood-pressure is low; if it is high, for cathartics, diuretics, theobromine, nitroglycerin and alkalies.

Manifestations referable to the venous system, consisting of **hemorrhoids** and other varicose conditions, do not present any special indications in gouty cases. Careful hygienic precautions in connection with defecation would keep many of them free of the complications of infected hemorrhoids.

Phlebitis is extremely common in some gouty subjects. It appears that this form of phlebitis involves less exposure to embolism than do others, and that immobilization need not, therefore, be quite as strict. Nevertheless, reasonable caution suggests that the patient be warned of the ever-present possibility of embolic complications if he fails to place the affected member at rest and apply collargol ointment or compresses moistened with ammonium chloride solution.

Nervous Symptoms.—Some of these are of an ordinary type, *e.g., insomnia, headache and vertigo (q.v.)*.

Among the striking nervous conditions that may occur, special mention will be made of *delirium*, as a typical symptom affording a basis for discussion of the therapeutic indications.

Thus, when he is called to see a delirious individual who is known to be gouty, it is incumbent on the physician carefully to rule out—by examination of the urine, vessels and heart, and reflexes; by auscultation; from the history, and by all clinical means available—*uremic disturbances, organic brain conditions, alcoholic delirium* and the delirium symptomatic

of the onset of a *febrile infection* (*pneumonia, otitis, influenzal sinusitis*), and, as H. Rendu already advised, "to recognize the possibility of an acute gouty congestion only by exclusion or when sudden cessation of the joint attack positively appears to have been the starting-point of the nervous phenomena."

When the diagnosis of *delirium due to congestion of gouty origin* has been made, the physician should endeavor to rekindle or bring on joint involvement by the use of mustard foot-baths, mustard poultices; rubbing over the joints of the feet or the knees with a stimulating alcoholic, ammoniacal or turpentine liniment and very hot fomentations.

A drastic cathartic (jalap, scammony) should next be administered, and after it free irrigations of barely tepid water which will tend to increase diuresis, in conjunction with free ingestion of fluids by the mouth (diuretic mineral waters, skimmed milk, infusions of apple, bean leaves or European ash leaves), to which lithium benzoate, piperazin, etc., have been added.

Leeches may be applied over the mastoid processes, or venesection carried out.

Lukewarm baths are generally followed by temporary relief.

Among the drugs, those acting as sedatives in nervous excitement, *viz.*, bromides, chloral hydrate, valerian and musk are strongly indicated.

As for colchicum, I believe it to be of advantage when given from the start.

Gout and Syphilis.—An atypical onset in gout is frequently an indication of earlier syphilitic infection. Cure of the syphilitic infection restores to gout its normal features. Mercurial treatment, which readily reinduces the acute gouty manifestations, should be given only during remissions (Finck and Vittel).

* * *

The metastatic manifestations of retrocedent gout may involve the digestive tract, heart or brain.

1. As these conditions can be definitely diagnosed only if there has been some distinct and suddenly suppressed joint involvement, or at least some signs of such involvement, an early indication is to endeavor to induce or bring back joint involvement whatever be the internal organ affected. This is done by means of mustard foot-baths prepared by adding 2 tablespoonfuls of mustard flour to 5 liters of water; by the application of mustard poultices, and by rubbing over

the joints of the feet or the knees a stimulating alcoholic, ammoniacal or turpentine liniment, such as:

R Spiritus juniperi	45	c.c. (f3iss);
Olei caryophylli,		
Olei myristicæ	āā	2.5 c.c. (m xl);
Terebinthinæ laricis (N. F. IV)	8	c.c. (f3ij);
Alcoholis	45	c.c. (f3iss).

M. Sig.: For external use.

Hot fomentations.

2. If *gastro-intestinal disturbances* are present (vomiting, hiccup, gastrospasm, gastralgia and tympanites, profuse diarrhea), they should be treated, according to the predominating symptom, by interdiction of all food and fluid by the mouth for a day or two, followed by restriction to water or a milk diet; very hot fomentations over the epigastrium, or mustard poulticing, or an ice-bag over the abdomen, or some antispasmodic or analgesic drug, after having made certain that renal permeability is not impaired.

3. In the event of *heart disturbances* (palpitations, arrhythmia, syncopal state, etc.), the measures indicated comprise precordial applications of ice or very hot water; hypodermic injections of 10 per cent. camphor in oil (1 cubic centimeter—16 minims—every two hours); alcoholic preparations; heart-tonics, with selection, according to the case, of strophanthus, digitalis, strychnine, sparteine or convallaria; or an alkali bromide.

4. If there are *brain manifestations* (delirium, coma or convulsions), the treatment should be that already described in relation to delirium: Counterirritation over the joints, drastics, diuretics, nerve sedatives or diffusible stimulants, to which should be added baths, either tepid and prolonged or cold and brief, application of ice over the scalp, and withdrawal of blood by leeching behind the mastoids and general venesection (250 cubic centimeters—8 ounces) if the gouty patient is not already in a cachectic condition.

DIABETES MELLITUS.

GENERAL CONSIDERATIONS.

Diabetes mellitus is a *clinical symptom-group* devoid of specificity, characterized by a permanent or at least prolonged glycosuria, generally combined with polyuria, polydipsia, polyphagia and autophagia; it should be understood, however, that none of these symptoms is an essential one in all stages, and that, on the whole, the essential, characteristic manifestation is *habitual glycosuria with hyperglycemia*.

We say that diabetes is a clinical symptom-group and not a disease because diabetes (permanent glycosuria), in common with the casual and temporary forms of glycosuria, is neither ascribable to a single cause nor associated with constant pathologic lesions.

Clinical observation and experimental work have shown, indeed, that there may exist a *temporary* or a *permanent (diabetic) glycosuria*:

Either through *hyperglycophagia* (alimentary glycosuria); through *muscular hypoglycolysis* (insufficient exercise); through *disease of the liver* (hepatic diabetes), *the pancreas* (pancreatic diabetes), *the kidneys* (renal diabetes), *the thyroid* (Graves's disease) or *the nervous system* (nervous diabetes); through a *congenital metabolic dystrophy* ("neuro-arthritis diathetic diabetes"), or through *intoxication* (carbon monoxide diabetes), etc.

* * *

The above enumeration forms the basis of three important practical requirements:

1. The need of **studying a glycosuric patient thoroughly** if one wishes to institute a rational and truly causal treatment.

2. The need of **individualizing the treatment** of diabetics, since one case may call for specific medication (syphilitic cirrhosis), another for X-ray treatment of the thyroid gland (Graves's disease), a third for a general reduction of diet with special days of starvation and alkaline and purgative medication (neuro-arthritis diathetic diabetes), while a fourth is largely beyond medical aid (cancer of the pancreas).

This careful preliminary study will sometimes permit of dispelling an incipient diabetes with the utmost ease. "My advice was sought a few years ago," wrote Lépine, "by a manufacturer about fifty years of age, free of inherited morbid taints. He was leading a normal life and was not subject to worry; his diabetic condition had set in about two years before.

"After prolonged questioning I finally learned that during the preceding three years he had made a change in his daily routine which he wrongly deemed of little consequence; he had taken up his abode directly at the factory, whereas previously he had walked to and from the factory twice daily, thus covering a distance of 8 kilometers. Upon finding out this fact, I recommended that he take a walk for two hours each day. I also adjusted his diet. The glycosuria disappeared."

Such easy cases are exceptional. Yet a number of similar instances are met with.

3. **The risk and futility of simple therapeutic schemes** based on an idea that a certain dietary plan, the ingestion of a drug, or the literal execution of a definite dietetico-pharmaceutic system is indiscriminately the curative procedure in different cases of diabetes.

Every generation of medical men has witnessed the rise and fall of such therapeutic systems. All of them, applied blindly, without distinction, to any cases of glycosuria, yield a varying percentage of more or less brilliant cures (where the case has been a suitable one) and one of regrettable disasters (where the system has missed its mark). At length, general conclusions are reached, and by dint of critical consideration, there often remain finally certain procedures which are of interest and marked utility if applied with due circumspection.

* * *

In truth, the majority of these systems are especially aimed at one variety—the commonest, perhaps—of the glycosurias, *viz.*, *constitutional diabetes*, sometimes termed neuro-arthritic, on account of its obvious clinical kinship with gout, obesity and the lithiases. It is precisely because I have particularly in view this “diathetic” type of diabetes that, after much hesitation, I have made a sacrifice to general custom and taken up under the *Metabolic Diseases*, along with gout, the consideration of diabetic conditions which should logically have been classed under the symptoms, glycosuria being almost as common a symptom as albuminuria, which no one would now think of considering as a disease.

It is, therefore, neuro-arthritic diabetes which we shall have chiefly in view herein. Yet, not losing sight of the many other forms of glycosuria, we shall eventually, in the course of the discussion, mention the rational treatment of these various forms.

Even in connection with this diathetic type of diabetes alone, however, **the treatment must be strictly individualized**, and the following propositions, so continuously overlooked, emphasized to the utmost:

1. **Disappearance of sugar from the urine is one of the objects, but not the only one**, nor even always the most important one, which the therapist must try to attain.

2. **The cure or prevention of acidosis is as important as the disappearance of sugar.** Over half of the deaths in diabetes are brought on by acidosis.

3. **The treatment, dietetic in particular, depends on the age, weight and dietetic habits of the patient; on his obesity or leanness and on occupational conditions.**

4. The treatment must **take into account complicating factors** (plethora, arteriosclerosis, albuminuria, tuberculosis, etc.).

DIET IN DIABETES.

Innumerable studies are constantly being made of the dietetics of diabetes. A few, rather searching, which have been carried out in the course of the last twenty years, have led to considerable advances in this connection. I shall endeavor to present the net practical results of these studies.

I.—CARBOHYDRATE TOLERANCE IN DIABETICS.—1. **There is no diabetes; there are only diabetics.**—This was what Bouchardat was emphasizing when he wrote of the “personal equation of sugar utilization,” and what later observers rediscovered and termed “variable glycolytic power” or “coefficient of carbohydrate utilization.” Every diabetic patient, indeed, possesses a tolerance of carbohydrates which is peculiar to himself; the tolerance varies greatly in different cases. Determination of this limit of tolerance of the organism under consideration to carbohydrates is not only a therapeutic, but also a prognostic necessity. Such a determination can be effected rather easily by ordering for two or three days a diet containing a definite amount of carbohydrates and measuring the amount of sugar passed during the same period; comparison of the weight of carbohydrates ingested with the weight of sugar eliminated will show this limit of tolerance. Supposing that the tolerance is 100 grams, the following rule may for dietetic purposes be adopted: Allow 60 grams of carbohydrates (two-thirds of the tolerance) if the patient is below thirty-five years of age, and 80 grams (four-fifths of the tolerance) if he is over forty-five years of age. The test will have to be repeated from time to time, as the tolerance may vary.

If, on the other hand, the amount of sugar eliminated is greater than that of the carbohydrates ingested, one is dealing with one of those cases, generally very serious, in which the patient manufactures sugar even from the ingested proteins; one may thus be led to order very stringent diets—in truth, only exceptionally—in which even the proteins must be temporarily excluded, bearing in mind that 100 grams of protein may yield 40 grams of sugar.

There is one circumstance under which the indications based on carbohydrate tolerance must give way to a liberal, systematic administration of carbohydrates, *vic.*, acetonemia, that sword of Damocles to which the patients on too restricted diets are exposed.

One may also, as we shall see further on, in conformity with Allen's method, administer, while making repeated uranalyses, a series of

exactly measured, reduced, but gradually increasing diets, which allow the observer to ascertain with great precision the limit of carbohydrate tolerance.

Finally, there are observed, in relation to certain common foods, such as milk, fruits, etc., *very pronounced idiosyncrasies*—instances of intolerance or, on the contrary, of tolerance of remarkable degree from the standpoint of glycosuria. These idiosyncrasies should be carefully looked for, and frequently auto-observation by the patients themselves is of the greatest utility in this connection.

II.—TOLERANCE OF DIABETICS FOR FATS AND FOR ALCOHOL.

1. An increased allowance of fats in diabetics is not an insignificant matter, for it favors the production of ketones. Therefore, if, in severe diabetes, a diet consisting predominantly of fats is ordered, it should be carefully guarded by frequent urinalyses and should be changed by the substitution of readily assimilable carbohydrates as soon as the urine shows traces of acetone.

In diabetic cases of slight or intermediate severity, however,—in all cases free of all threat of acetonemia—the fats remain of inestimable value. They are the natural and necessary substitutes for carbohydrates in diabetics. There is nearly always advantage, however, in limiting their use to fairly moderate amounts.

2. Alcohol is a better food for diabetics than earlier observations had led us to suppose. It considerably reduces, indeed, the formation of ketones, improves the assimilation of sugar, and favors even more than do fats the metabolism of nitrogenous foods. In consequence, it is a rational measure in severe cases to replace a part of the fats in the diet by alcohol. From 50 to 80 grams of alcohol (supplying 350 to 560 calories) appears to constitute the optimal daily allowance for severe cases.

It is a well-known dietetic observation that addition of wine to the diet considerably facilitates the digestion of fats.

Diabetics generally tolerate alcohol very well, but one should take care that its use does not pass into abuse. In mild cases the allowance should be reduced appreciably below the amount above specified. Nor should the usual contraindications to alcohol be overlooked, *viz.*, arteriosclerosis, albuminuria, nephritis, cirrhosis, neuritis, etc.; it will be well also to be particularly careful in the diabetes of children.

III.—PROTEIN TOLERANCE IN DIABETICS.

—The following propositions laid down some years ago by Linossier and Lemoine appear to retain all of their original value:

(1) The diet for a diabetic should be studied not only as regards the carbohydrate allowance but also as to the total quantity of food. Study of the protein allowance is of especial importance.

(2) Protein substances may aggravate glycosuria through the sugar they yield upon being split up in the body, but this process comes into play only in the metabolic glycosurias (due to a metabolic defect), and not in the alimentary glycosurias (excessive carbohydrate intake).

(3) In all forms of diabetes proteins may aggravate glycosuria by exerting *per se* an unfavorable effect on the ill-defined metabolic disturbance of which glycosuria is the consequence.

(4) They may aggravate diabetes even in cases in which they do not accentuate the glycosuria.

Von Noorden regards as a useful dietetic procedure in all diabetics in which restriction of carbohydrates proves insufficient to eliminate the sugar from the urine, a reduction of the normal protein allowance to between 60 and 70 grams for two weeks in alternation with a normal allowance of 100 to 120 grams for the next two weeks. This suggestion is worth remembering.

STARVATION TREATMENT.—The favorable influence of starvation cures, introduced into the therapeutics of diabetes by Guelpa in 1910 and systematized in America by Allen, has been carefully studied by Marcel Labbé, whose observations (*Soc. méd. des Hôp.*, 1921) will now be summarized.

In diabetics without malnutrition, where the disturbance of sugar regulation is moderate, glycosuria generally disappears on the first or second day of starvation. In the more severe cases, where glycosuria persists in spite of dieting, a starvation cure for three days results in immediate cessation of the glycosuria and an increase in the patient's carbohydrate tolerance. The tolerance may increase to such a point that the diabetic is enabled thereafter to withstand without glycosuria amounts of carbohydrates which previously caused abundant glycosuria.

Far from inducing acidosis, the starvation cure, on the contrary, causes it to diminish and disappear.

A three-day fast lowers the weight by 300 to 1800 grams.

At rest, the starvation cure is very well borne. It may be continued for two to four days, repeated more or less frequently according to the results obtained, or be replaced by a simple diet of green vegetables.

In the forms of *diabetes attended with impairment of nutrition*, starvation cures lead only to a very temporary improvement. The gly-

cosuria, hyperglycemia and acidosis recede slightly and evanescently, but do not disappear. Such cures increase the nitrogenous malnutrition, a prime danger in poorly nourished diabetics. In these cases, the starvation cure should be employed only for the purpose of warding off coma, and not prescribed systematically.

THE TOTAL FOOD ALLOWANCE OF DIABETICS.—*The diet instituted should be sufficiently nourishing to keep the metabolic interchanges in a balanced state, i.e., to avoid the twofold danger of inadequate nutrition, with wasting of the tissues, and excessive nutrition, with resulting return of glycosuria, excessive nitrogen elimination in the urine, etc. In this connection three things afford guidance, viz., regular weekly weighing of the patient, regular urinalyses (output, specific gravity, etc.), and the following calorimetric considerations:*

It is clear that in calculating the diabetic's food allowance the amount of sugar eliminated in the urine and consequently lost for nutritive purposes should be taken into account. Thus:

Case #1: Intake	250 grams	carbohydrates	= 1000 calories.
Urine	25 grams	"	= 100 "
Nutrient residue	225 grams	"	= 900 calories.
Case #2: Intake	250 grams	carbohydrates	= 1000 calories.
Urine	100 grams	"	= 400 "
Nutrient residue	150 grams	"	= 600 calories.

The same calculation would, of course, apply to the total food allowance. Therefore, in the diabetic, the theoretic caloric calculation of the maintenance ration should be carried out by adding to the allowance of a normal person of the same body weight the number of calories equivalent to the amount of sugar eliminated in the urine in the twenty-four hours.

As we have seen, it is generally considered that a person expends 30 to 35 calories a day per kilogram of body weight, when at rest. Combustion of one gram of sugar yields approximately 4 calories. Thus, if W is the weight of the patient, and w , the weight of the sugar passed in twenty-four hours, the number of calories needed for this individual will be:

$$C = 30W + 4w$$

Given a man weighing 75 kilograms eliminating 100 grams of sugar. His dietary allowance will have to supply him with *approximately*:

$$(30 \times 75) + (4 \times 100) = 2650 \text{ calories.}$$

It seems, however, to have been shown by the investigations of various clinicians that, contrary to opinion in the past, one may and must recognize that the food requirements of the stout diabetic or arthritic diabetic are less than those of normal individuals. Again, it cannot be repeated too often that nothing equals a direct study of the patient himself.

Clinical conclusion: In diabetics it is a rational procedure to reduce the protein foods to a moderate amount corresponding, for practical purposes, to 70 to 100 grams of albumin; to reduce the allowance of carbohydrates in conformity with the results of clinical experience, and to complete the food ration with fats. In spite of the widely held view to the contrary, the organic requirements of arthritic diabetics under correct treatment, *i.e.*, receiving a diet appropriate to their condition, do not exceed those of the normal subject; they may be in the vicinity of 30 calories per kilogram, or even less.

In short, from the aggregate of observed facts there is deduced the following definite conclusion expressed by Linossier: *An arthritic diabetic may be reduced in weight with no more disadvantage than a normal subject.* The diet of a stout diabetic should be such as to cause him to lose weight.

This is, in my opinion, the greatest dietetic acquisition made in thirty years; it spells the doom of the notion that a diabetic patient should not lose weight. The stout diabetic can and must be reduced if he is to improve and get well.

This result may be attained:

Either by the institution of more or less stringent reduction diets laid down in accordance with the foregoing remarks and followed so as to obtain, along with a gradual reduction of the patient's weight, disappearance of the sugar and of the accompanying diabetic manifestations.

Or, in accordance with Guelpa's procedure, by abrupt, complete withdrawal of food (except fluid, in the form of tea) for three days, at varying intervals, with or without concurrent saline purgation.

Or, by a simpler plan in which, after beginning the treatment with food restriction of varying stringency, or even with two or three days of fast with purgation (Guelpa), there is instituted a gradually increasing diet which affords information as to the carbohydrate tolerance of the patient, such treatment being interrupted upon occasion, when sugar reappears or the acidity of the urine rises, by days or half-days of fast. This method has been systematized and worked out in detail by Allen.

The following data, affording a summary of the plan of treatment applied by Allen and Joslin, are borrowed from Rose Donk (*Jour. A.M.A.*, July 5, 1919).

What combinations of proteins, fats and carbohydrates can be adopted for diabetic cases? The tables presented herewith permit of the building up of such combinations in a systematic manner.

To apply these tables in a concrete case, let us suppose that we are dealing with a patient with **moderate glycosuria**, an **average eater**, without any special tendency to acidosis. We may begin with a diet containing 100 grams of carbohydrates, no fats, and 50 to 100 grams of proteins. In Table I, Column 5, the diet yielding 102 grams of carbohydrates, afforded by 2200 grams of vegetables poor in carbohydrates (5 per cent.) or their equivalents, 90 grams of potatoes and 30 grams of bread, may be suitable for this patient. It represents 50 grams of proteins and 102 grams of carbohydrates, without any fats, and may be instituted in the following manner:

Breakfast:

	Vegetables of low (5%) carbohydrate content.
Coffee +	Grams.
Half an orange, approximately	200
Tomatoes, 200 gm.	200
Celery, 100 gm.	100
Lettuce, 100 gm.	100

Lunch:

Lean broth, 300 c.c. (little salt, no fats, little protein).	
Potatoes, 60 gm., +	
Beets (10% carboh.), 100 gm., equivalent to	200
Cabbage, 300 gm.	300
String beans, 300 gm.	300

Dinner:

Potatoes, 30 gm., +	
Bread, 30 gm., +	
Purée (10% carboh.), 100 gm., equivalent to	200
Turnips (10% carboh.), 100 gm., equivalent to	200
Spinach, 300 gm.	300
Water cress, 100 gm.	100
	<hr/>
	2200

The allowance should be increased gradually, according to tolerance and in conformity with the data presented in the above tables, permitting of systematic progression. There should be interspersed,

at varying intervals, fast days or half-days, with restriction to water and with or without purgation.

The chart presented below shows how accurately the results of this type of treatment can be followed.

Regarding the results to be obtained from such treatment, Williams (*Amer. Jour. Med. Sci.*, July, 1921) reported having applied the Allen treatment in 100 diabetics with mild glycosuria. He does not recommend prolonged fasting, and regulates the food allowance with a view to keeping the glycemia as low as possible. The immediate results were excellent. As for the ultimate prognosis, the following points should be noted:

In mild diabetes, this method of treatment may restore the patient to such a condition that he will again be able to take ordinary food without quantitative restrictions; in the majority of cases, the patients are enabled to partake of everything, though without excesses, and while abstaining from the use of sugar.

Severe diabetes cannot be cured, despite strict observance of the Allen treatment; but restricted diets (600 to 700 calories) will prolong life for several years.

The advantages of the treatment offset, for the patient, the difficulties of its application, as he is enabled to lead a moderately active existence for a longer time.

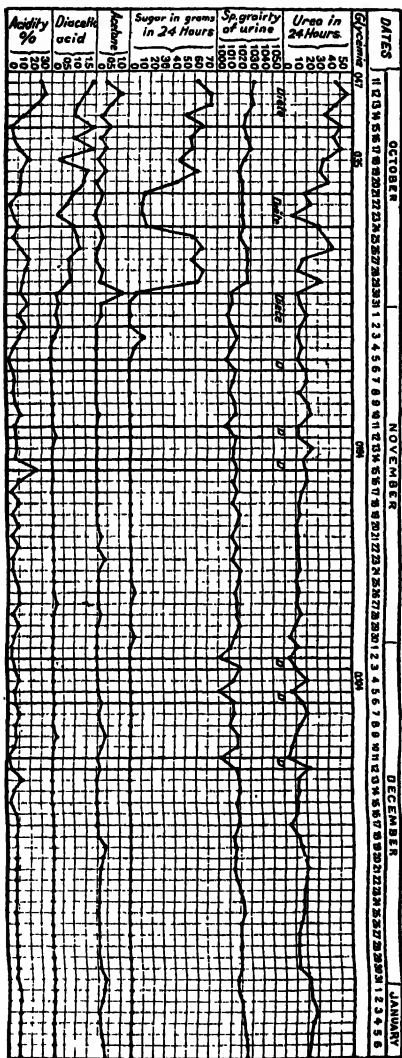


Fig. 348.—Chart showing the clinical course in a severe case of diabetes (Donk).

FOOD VALUES OF THE VEGETABLES OF LOW (5 per cent.) CARBOHYDRATE CONTENT, SUCH AS TOMATOES, CELERY, LETTUCE, WATER CRESS, SPINACH, CABBAGE, SALADS, STRING BEANS, ETC., WITH GRADUAL ADDITION OF POTATOES AND BREAD.—Gr., grams; P, protein; C, carbohydrate; F, fat; Cal., calories.

Column 1				Column 2			Column 3			Column 4		
5 per cent. vegetables or their equivalent.				Column 1 + 30 grams of potatoes.			Column 2 + 30 grams of potatoes.			Column 3 + 30 grams of potatoes.		
Gr.	P.	C.	Cal.	P.	C.	Cal.	P.	C.	Cal.	P.	C.	Cal.
200	4	6	40	5	12	68	6	18	96	7	24	124
400	8	12	80	9	18	108	10	24	136	11	30	164
600	12	18	120	13	26	148	14	30	176	15	36	204
800	16	24	160	17	30	188	18	36	216	19	42	244
1.000	20	30	200	21	36	228	22	42	256	23	48	284
1.200	24	36	240	25	42	268	26	48	296	27	54	324
1.400	28	42	280	29	48	308	30	54	336	31	60	364
1.600	32	48	320	33	54	348	34	60	376	35	66	404
1.800	36	54	360	37	60	388	38	66	416	39	72	444
2.000	40	60	400	41	66	428	42	72	456	43	78	484
2.200	44	66	440	45	72	468	46	78	496	47	84	524
2.400	48	72	480	49	78	508	50	84	536	51	90	564
2.600	52	78	520	53	84	548	54	90	576	55	96	604
2.800	56	84	560	57	90	588	58	96	616	59	102	644
3.000	60	90	600	61	96	628	62	102	656	63	108	684
3.200	64	96	640	65	102	668	66	108	696	67	114	724
3.400	68	102	680	69	108	708	70	114	736	71	120	764
3.600	72	108	720	73	114	748	74	120	776	75	126	804
3.800	76	114	760	77	120	788	78	126	816	79	132	844
4.000	80	120	800	81	126	828	82	132	856	83	138	884
4.200	84	126	840	85	132	868	86	138	896	87	144	924
4.400	88	132	880	89	138	908	90	144	936	91	150	964
4.600	92	138	920	93	144	948	94	150	976	95	156	1.004
4.800	96	144	960	97	150	988	98	156	1.016	99	162	1.044
5.000	100	150	1.000	101	156	1.028	102	162	1.056			

Column 5			Column 6			Column 7		
Column 4 + 30 grams of bread.			Column 5 + 30 grams of bread.			Column 6 + 30 grams of bread.		
P.	C.	Cal.	P.	C.	Cal.	P.	C.	Cal.
10	42	208	13	60	292	16	78	376
14	48	248	17	66	332	20	84	416
18	54	288	21	72	372	24	90	456
22	60	328	25	78	412	28	96	496
26	66	368	29	84	452	32	102	536
30	72	408	33	90	492	36	108	576
34	78	448	37	96	532	40	114	616
38	84	488	41	102	572	44	120	656
42	90	528	45	108	612	48	126	696
46	96	568	49	114	652	52	132	736
50	102	608	53	120	692	56	138	776
54	108	648	57	126	732	60	144	816
58	114	688	61	132	772	64	150	856
62	120	728	65	138	812	68	156	896
66	126	768	69	144	852	72	162	936
70	132	808	73	150	892	76	168	976
74	138	848	77	156	932	80	174	1.016
78	144	888	81	162	972	84	180	1.056
82	150	928	85	168	1.012	88	186	1.096
86	156	968	89	174	1.052	92	192	1.136
90	162	1.008	93	180	1.092	96	198	1.176
94	168	1.048	97	186	1.132	100	204	1.216
98	174	1.088	101	192	1.172			
102	180	1.128						

Column 8	Column 9	Column 10	Column 11	Column 12	Column 13	Column 14
Column 7 + 30 grams of lean meat.	Column 8 + 30 grams of lean meat.	Column 9 + 30 grams of lean meat.	Column 10 + 20 grams of cheese.	Column 11 + 30 c.c. of 20 per cent. cream.	Column 12 + 30 c.c. of 20 per cent. cream.	Column 13 + 10 grams of butter.
P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.
52 31 7 515	60 36 7 592	68 41 7 669	74 48 7 756	75 54 8 818	76 60 9 880	76 68 9 952
56 31 13 555	64 36 13 632	72 41 13 709	78 48 13 796	79 54 14 858	80 60 15 920	80 68 15 992
60 31 19 595	68 36 19 672	76 41 19 749	82 48 19 836	83 54 20 898	84 60 21 960	84 68 21 1,032
64 31 25 635	72 36 25 712	80 41 25 789	86 48 25 876	87 54 26 938	88 60 27 1,000	88 68 27 1,072
68 31 31 675	76 36 31 752	84 41 31 829	90 48 31 916	91 54 32 978	92 60 22 1,040	92 68 33 1,112
72 31 37 715	80 36 37 792	88 41 37 869	94 48 37 956	95 54 38 1,018	96 60 39 1,080	96 68 39 1,152
76 31 43 755	84 36 43 832	92 41 43 909	98 48 43 996	99 54 44 1,058	100 60 45 1,120	100 68 45 1,192
80 31 49 795	88 36 49 872	96 41 49 949	102 48 49 1,036	103 54 50 1,098		
84 31 55 835	92 36 55 912	100 41 55 989				
88 31 61 875	96 36 61 952					
92 31 67 915	100 36 67 992					
96 31 73 955						
100 31 79 995						

Column 15	Column 16	Column 17	Column 18	Column 19	Column 20	Column 21	Column 22
Column 14 + 10 grams of butter.	Column 15 + 30 grams of bacon.	Column 16 + 30 c.c. of 20 per cent. cream.	Column 18 + 20 grams of lean meat.	Column 19 + one egg.	Column 20 + 10 grams of butter.	Column 21 + 15 c.c. of olive oil.	Column 22 + 15 c.c. of olive oil.
P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.	P. F. C. Cal.
76 76 9 1,024	81 91 9 1,179	82 97 10 1,241	90 102 10 1,318	96 108 10 1,396	96 116 10 1,468	96 131 10 1,603	96 146 10 1,738
80 76 15 1,064	85 91 15 1,219	86 97 16 1,281	94 102 16 1,358	100 108 16 1,436	100 116 16 1,508	100 131 16 1,643	100 146 16 1,778
84 76 21 1,104	89 91 21 1,259	90 97 22 1,321	98 102 22 1,398				
88 76 27 1,144	93 91 27 1,299	94 97 28 1,361	102 102 28 1,438				
92 76 33 1,184	97 91 33 1,339	98 97 34 1,401					
96 76 39 1,224	101 91 39 1,379	102 97 40 1,441					
100 76 45 1,264							

THE DIET IN UNCOMPLICATED DIABETES.—Knowledge of the factors previously mentioned, *viz.*, the amount of carbohydrates tolerated by the system, idiosyncrasies in relation to the ordinary foods, the approximate caloric coefficient, the digestive capacity of the patient, and uranalysis permit of the formulation of a rational diet, subject to modification according to the indications afforded by systematic clinical observation.

It is advisable to re-examine the urine in order to find out whether the patient's carbohydrate tolerance has not undergone a change; the tolerance increases under a proper diet.

In private practice, it is often difficult to determine the carbohydrate tolerance as precisely as in the clinic. Under these circumstances, the diet should be formulated in accordance with established principles, with adaptations to the individual peculiarities of the patient (weight, condition of the digestive tract, heart, kidneys, etc.).

If a change in the diet prescribed is required, the physician will readily learn the fact:

1. By observing the diminution or increase of sugar and of acidosis and acetonemia.

2. From the improved or impaired subjective feelings of the patient.

3. By inquiry into the general condition and any changes in the diabetic symptoms (polydipsia, polyphagia, weakness, itching, furunculosis, etc.).

The following standard diet may be adopted, with the distinct understanding:

1. That the expressions "allowed without restriction, allowed in moderation, and forbidden" are to be taken only with due allowances for existing circumstances.

2. That the diet instituted should aim to reduce the total amount of food taken.

3. That it will be very advantageous to intersperse periods of one-half to three days in which the patient is restricted to the taking of tea, with or without alkaline purgation (Guelpa).

Outline of Diet for Uncomplicated Diabetes.

SOLID FOODS.

1. Allowed without restriction:

Articles of animal origin: Meats of all kinds (game in moderation), fowl, viscera, meat juice. Smoked meats (ham, tongue), sausages, meat loaf, etc.

Fish of all kinds, fresh water or sea, fresh, smoked or preserved in oil; frogs' legs.

Oysters, mussels, crabs, lobster.

Eggs in all forms, except with flour or sugar; caviar.

Cream, butter, cheese, lard, beef marrow, potted pork.

Articles of vegetable origin (boiled and allowed to drip): Spinach, lettuce, romaine, corn salad, endive, chicory, celery, cooked salads, raw salads, Brussels sprouts, pickles, asparagus, water cress.—Walnuts, filberts, almonds, olives, peanuts, pistachio-nuts.

II. *Allowed in moderation:*

Permitted in moderate amounts and under medical supervision: Cabbage, cauliflower, sauer kraut, turnips, radishes, potatoes.

String beans, sweet potatoes, artichokes, mushrooms, salsify, tomatoes.

Whortleberries, oranges, currants, strawberries, raspberries.

Bread in small amount (40 to 80 grams), regulated by special instructions.

III. *Forbidden:*

In the absence of a special indication: All foods made with flour or sugar.

Rice, tapioca, sago, oatmeal, flour, cereals, rye, corn, wheat, pastes (macaroni, etc.).

Peas, lentils, beans, chestnuts.

Beets, carrots, onions.

Pastry, sugar, sweetened foods, confections, puddings.

Sweet fruits: Grapes, dates, figs, cherries, sweet plums, peaches, bananas, melons, preserves.

Likewise forbidden are: Preserved or pickled meats, gamey articles.

The following table will be found of practical utility:

100 grams of the following vegetables and fresh fruits contain:	CARBOHYDRATES IN GRAMS.		100 grams of the following starchy foods contain:
Melon	6.50	12.50	Cooked navy beans.
Turnips	7.50	15.50	Artichokes.
Strawberries	9.00	15.60	Peas.
Cooked red beets	9.50	17.65	Sweet potatoes.
Lemon	10.00	21.20	Boiled potatoes.
Carrots	10.30	25.55	Fresh beans.
Oranges or tangerines ..	10 to 11.00	44.60	Fried potatoes.
Mulberries	11.00	47.10	Whole wheat bread.
Currants and gooseberries	12 to 13.00	51.30	Average white bread.
Raspberries	12.70	56.90	Dried beans.
Dry filberts	12.50	59.20	Dried lentils.
Fresh shelled almonds ..	13.40	59.50	Dried peas.

LIQUID FOODS.

I. *Allowed without restriction:*

Water, alkaline waters, tea, coffee.

Light, dry wines.

Meat bouillon with addition, as desired, of meat juice, green vegetables, eggs, asparagus or cheese.

II. *Allowed in moderation:*

Milk, almond milk without sugar, lemonade without sugar.

III. *Forbidden:*

All alcoholic beverages other than light, dry wines; syrups, sweetened lemonade, ice cream, sherbet and chocolate.

Culinary Remarks: The above articles may, according to circumstances, be boiled, roasted, or cooked in butter, lard, oil or wine; seasoned with salt, pepper, spices, mustard, pickles, parsley, tarragon, chervil, cloves, capers, laurel, etc.; accompanied by various sauces, butter, or mayonnaise, in the preparation of which no flour has been used.

Desserts may be prepared with eggs, cream, almonds, gelatin and lemon. Sugar is to be replaced by saccharin.

Flour and sugar should be completely excluded from the cooking.

* * *

The **milk cure** advocated by Le Noir is deserving of mention. He recommends "five-day cures during which the patient's food intake is limited to 2 to 3 liters of milk—most frequently the mean amount, $2\frac{1}{2}$ liters—taken in equal amounts at even, but rather short intervals, thus endeavoring to obtain a moderate reduction of the dietary allowance in conjunction with a regular, fractional ingestion of the food taken. The milk cure should be repeated at intervals varying inversely with the severity of the disease and, it must also be admitted, the docility of the patient. Apart from these cures, the diet ordered should be the ordinary antidiabetic diet without excessive stringency, and especially, without exaggeration of the total food allowance."

Le Noir has reported striking recoveries under this simple procedure, which is worthy of recommendation.

PHYSICAL THERAPY.

Myotherapy.—The *daily physical exercise should be sufficient* to insure muscular glycolysis and activate the respiration, oxygenation and the oxidation processes in the tissues. It *should not be excessive*, in order not to

burden the system with insufficiently oxidized katabolic products and thus aggravate auto-intoxication (coma has been observed to set in promptly after physical over-exertion in diabetics); in order not to weaken the patient through nervous exhaustion, and in order not to expose him to sweating and subsequent chilling which would favor the onset of respiratory affections—often a serious complication in diabetics.

The patient should be advised to take walks and, according to his age, general condition and apparent powers of endurance, open air sports, such as tennis, bowling on the green, hunting, etc. Trousseau noticed that in the hunting season his glycosuric patients "took in less of fluids and passed less water, regained their strength, appetite and, in spite of the fatigue, their sexual faculties, lost since the beginning of the disease." Horseback and bicycle riding, billiards, gardening and rowing may be recommended provided they are not overdone and chilling is avoided.

In women, active household duties, including the use of the sewing-machine (sewing by hand to be avoided), should be recommended, together with walking, tennis and dancing.

The amount of exercise should be regulated on the basis of a chart of the patient's weight as compared to his or her height (the diabetic, like the tuberculous case, should be weighed regularly every eight or ten days), a glycosuria chart, and the presence or absence of a positive test for acetone.

If need be, a still more methodical system of exercising may be instituted with the aid of Swedish gymnastics, apparatus of the Zander type (mechanotherapy), various exercisers, etc.

MINERAL WATERS.

Alkaline waters (*bicarbonate* waters) are suitable for patients exhibiting diabetes, excessive nitrogen output in the urine, loss of weight and acidosis, for those with uricemia, and for the gouty. They are not advisable in the advanced stages of the disease nor in cases with subnormal urinary nitrogen.

Calcium sulphate waters are mainly suitable for glycosuric cases with uricemia in which a moderate stimulation of katabolism is desired without unfavorably influencing the general condition.

Sodium chloride waters (with *bicarbonate* or *sulphates*) are suitable in obese diabetics, those with abdominal plethora and hepatic or renal congestion, and those suffering from dyspepsia and hemorrhoids. They are contraindicated in aged, emaciated, depressed or albuminuric patients.

Arsenical waters may be recommended in cases with muscular exhaustion, anemia, excessive urinary nitrogenous output, neuralgia, neuritis, and especially, the diabetic skin disturbances. They are contraindicated in the presence of congestion of internal organs.

Alkaline iron waters may be advised in asthenic, neurasthenic and anemic cases whenever the general treatment has to take the lead over the treatment of the glycosuria.

MEDICINAL TREATMENT.

In the treatment of diabetes mellitus, general hygienic and dietetic measures stand foremost; medicinal treatment (aside from insulin) takes only a second place and is merely an adjunct.

The frequency of the disease, its usual chronic course, and the credulity of the public have—as in many other fields—led to the offering of countless remedies, openly known or secret, with claims of an infallible cure of the disease. The clinical truth is that so far no drug has been discovered that will dispel glycosuria permanently.

Sodium bicarbonate, opium and antipyrin are, among all the drugs recommended (apart from insulin) those that have proven the most active in certain cases. Hepatic organotherapy has given only uncertain results, and the results from pancreatic extracts (previous to insulin) have been poor. Suprarenal and thyroid preparations have, however, been unquestionably shown to exert a “glycogenic” action.

The treatment by insulin marks an important advance in the treatment of diabetes with impaired nutrition and of diabetic coma.

It is advisable, indeed, to make a distinction between the remedies directed more especially to the treatment of the existing defect in dealing with sugar and those that may be called for by reason of some special indication (general asthenia, secondary infections, etc.), constituting symptomatic measures devoid of specific significance.

* * *

The drugs that have most commonly been used in the treatment of diabetes are the *alkalies*, the *nervines* (antipyrin, opium, belladonna, strychnine, valerian), the *evacuants* (purgatives), the *alteratives* (sodium salicylate, iodine, arsenic, glycerin), the *yeasts*, the *oxidizers* (manganese salts) and the *gland products* (hepatic and pancreatic extracts).

The introduction of the **alkalies** into the treatment of diabetes was based on one mistaken conception and one true principle, the former concerning the lack of alkalinity of the blood in diabetics and the latter, Chevreul's axiom to the effect that the alkalies materially favor the oxidation of organic substances. The alkalies also exert a favor-

able influence in the treatment of diabetes both through their stimulating action on the digestive functions and their action in enhancing general nutrition. The benefit derived from a cure at Vichy in some forms and at certain stages of diabetes is well known.

The alkalies appear to be indicated mainly in cases of recent onset, middle-aged, still vigorous, stout rather than lean, plethoric rather than anemic, and in gouty diabetics in whom the urine contains much uric acid. In diabetic coma, the use of sodium bicarbonate has been credited with favorable effects by some.

Of the **nervine drugs**, opium has been used for by far the longest time. It allays the thirst, lessens the keenness of the appetite, and reduces the output of sugar; it is well borne by diabetics, even in large doses, and affords a useful diaphoretic effect.

It may be given in the form of extract of opium (0.02 to 0.1 gram— $\frac{1}{8}$ to $1\frac{1}{2}$ grains); morphine (0.01 to 0.02 gram— $\frac{1}{6}$ to $\frac{1}{3}$ grain); Dover's powder (0.2 to 0.4 gram—3 to 6 grains), or pantopon (0.03 to 0.06 gram— $\frac{1}{2}$ to 1 grain). Codeine (0.05 to 0.1 gram— $\frac{3}{4}$ to $1\frac{1}{2}$ grains), recommended by Pavy, Bouchard and Senator, is useful in diabetes with azoturia.

In general, *belladonna*, by reason of its arresting action on glandular activity (salivary and pancreatic, in particular), appears to have little to recommend it; it may do harm. It should be abstained from—as should opium, likewise—when the urine contains acetone.

Antipyrin, introduced empirically into the treatment of diabetes, exerts a manifest controlling influence on glycosuria, like opium. Added to blood *in vitro*, antipyrin retards glycolysis. According to Lépine and Porteret, its action in diabetes consists in hindering glycogenesis directly through an action on the liver cells and indirectly through the nervous system. It is especially suitable for use in nervous diabetes.

The **evacuants**, laxatives or purgatives, manifestly constitute one of the factors in the "cures" at Carlsbad and at Brides, in which sodium sulphate is combined with sodium carbonate and sodium chloride. These cures, in common with the regular administration of sodium sulphate at home, are indicated chiefly in obese or congestive diabetics, abdominal plethorics with hepatic and renal congestion, with stasis in the deep veins, constipation, hemorrhoids, etc.

At home they may be combined with the alkaline treatment, *e.g.*:

One hour before the noon and evening meals, a glass of warm Vichy water (Grande-Grille) to which have been added two teaspoonfuls of Carlsbad salts.

One might also prescribe:

R. Sodii bicarbonatis,
 Sodii citratis,
 Sodii sulphatis 20 grams (3v);
 Sodii salicylatis 10 grams (3iiss).

M. Sig.: One teaspoonful in the morning in a glass of warm water.

Organotherapy.—According to Gilbert and Lereboullet, diabetes the result of “hyperhepatia” (hepatic overactivity) is sometimes favorably influenced by *pancreatic extract* taken before meals in enteric-coated capsules of 0.25 gram (4 grains) each and in suppositories of 0.5 to 2 grams ($7\frac{1}{2}$ to 30 grains) inserted one hour before meals. Diabetes the result of “anhepatia” is, on the other hand, made worse by this measure, according to these observers.

The treatment of diabetes with *hepatic extract* has been studied mainly by Gilbert, Carnot and Lereboullet, who distinguish in this connection a form of diabetes due to *anhepatia* (hepatic insufficiency, cirrhosis, fatty hepatitis, nervous inhibition), characterized by a small output of sugar (below 50 grams) occurring solely or mainly three hours after a meal, moderate polyuria and low urea content, and a form of diabetes due to *hyperhepatia* (cirrhosis with pigmentation, hypertrophic cirrhosis, nervous, pancreatic and traumatic diabetes), characterized by a large output of sugar (above 100 grams), permanent and most marked four to six hours after a meal, pronounced polyuria and polydipsia, and a rapid course.

The hepatic preparations are asserted by them to be useful in the cases of anhepatic diabetes, in which they are stated to reduce or abolish the glycosuria, increase the urea content and improve the general condition; on the other hand, they are stated to be prejudicial in hyperhepatic diabetes, making the symptoms worse.

“Clinically, however,” writes Carnot, “these phenomena do not always come to pass with the simplicity of a didactic diagram; sometimes, for example, in the same case of diabetes hepatic opotherapy will first lead to disappearance of the sugar and later exert an opposite effect.” For practical purposes, one should be guided, in applying the treatment, by the results obtained.

The hepatic preparations may be administered either in the form of scraped or pounded *liver*, 100 grams ($3\frac{1}{3}$ ounces) daily in warm broth; by *enema*, as a maceration of 100 to 150 grams of hog’s liver in 200 to 250 cubic centimeters (6 to 8 ounces) of warm water (maceration to continue for at least three hours); in the form of *extracts*, such as glycerin extract or extract of whole liver, one teaspoonful representing 50 grams of fresh liver, two or three teaspoonfuls a day, or in the form of *glycogen*,

given in pills or a granular preparation in daily amounts of 1 to 1.5 grams (15 to 22½ grains).

Insulin at the present time is not a specific in diabetes, but the most powerful weapon we possess against the severe forms and against the complications of diabetes.

TREATMENT OF DIABETES WITH INSULIN.

What is insulin?—We owe insulin to the North American investigators who isolated the internal secretion of the islets of Langerhans, known as insulin, from the three digestive ferments which the external secretions of the pancreas pours into the intestine.

Various Preparations of Insulin.—There are on the market three kinds of preparations of insulin.

1. The *purified insulins*, obtained by the American processes. Pancreatic tissue is macerated in 85 per cent. alcohol to which is added sulphuric acid (3:1000). Then, by various complicated procedures, there are obtained solutions of insulin as clear as spring water: American insulin made by Eli Lilly (Iletin Lilly). The English insulin (Allen and Hanbury) is put up in ampoules of 5 cubic centimeters covered with a rubber hood; the latter is punctured with the needle when the requisite amount for injection is withdrawn, and the remainder of the ampoule is thus easily kept for the succeeding injections.

2. The *impure insulins*, obtained by a more simple process. (Mackenzie, Wallin and Chabanier). These possess the disadvantage of being more painful and of introducing into the patient pancreatic proteins and products of disintegration which may at length become toxic, when the treatment is kept up for several months: Insulyl Roussel (supplied in boxes of 6 ampoules containing 5 c.c. each).

3. *Insulin powders* have the advantage of not spoiling as do the solutions, which are stable only when the product is very pure: Insulin Byla (each ampoule containing 15 clinical units and being packed with one ampoule of 2 c.c. of physiologic salt solution into which it is dissolved just before injection) or Insulin Rogier.

Standardization.—Insulin not being a definite substance of permanent composition, it is indispensable that each sample undergo standardization. This is usually done by measuring the physiologic power of insulin to reduce the blood sugar.

Rabbits are injected with a dose sufficient to lower their blood sugar in a certain definite proportion.

The AMERICAN UNIT was formerly defined as the quantity of insulin necessary to reduce to 0.45 grams per thousand the blood sugar in a rabbit

weighing 2 kilograms, fasting from 16 to 24 hours previously. More recently, a unit the activity of which is three times less has been adopted.

The CHABANIER-ROUSSEL UNIT is the quantity of alcoholic extract of the pancreas that will reduce by 60 per cent. the blood sugar in a 2-kilogram rabbit after a 16 hours' fast. One Chabanier-Roussel unit is contained in 1 cubic centimeter of their insulin.

APPROXIMATE EQUIVALENTS.—One cubic centimeter of Roussel insulin has about the same activity as 1 cubic centimeter of insulin Lilly, but since 1 cubic centimeter of insulin Lilly contains 10 American units (Lilly), it is plain that one Chabanier-Roussel unit is equivalent to 10 (old) American units (Lilly).

These relative values are worth noting to have an exact understanding of the doses mentioned in the publications in various countries, the question of insulin dosage being still under investigation and subject to revision.

General Indications.—One cannot as yet think of treating all diabetics with insulin. Simple diabetes is still amenable to dietetic treatment almost exclusively, such dietetic treatment nearly always yielding a satisfactory result.

Insulin treatment is applicable almost exclusively to *severe diabetes*, wherein are noted not only a disturbed metabolism of the carbohydrates, but in addition profound changes in the metabolism of fats and protein substances. These cases, in which therapeutics previously had been of little avail, are in general very favorably influenced by insulin.

In the treatment of *diabetic coma*, it is no longer permissible to omit insulin.

In *consumptive diabetes with acidosis*, insulin leads to a better utilization of the carbohydrates, a more complete combustion of the fats and of the protein substances, with disappearance of the acetone bodies, and a manifest improvement in the general condition with a rise in the weight curve.

Diabetes in children, always so serious, calls for insulin from the outset.

Many *complications of diabetes* are favorably dealt with by insulin: *Pruritus, neuralgia, carbuncle, erysipelas, pneumonia, and gangrene.*

Where *surgical intervention* is necessary, prophylactic insulin treatment will prevent acidosis. In tuberculous diabetics the expediency of insulin treatment is in question. Chabanier maintains that when a diabetic fails to react to insulin, latent tuberculosis should be suspected. Blum even claims that insulin whips up pulmonary tuberculosis. This opinion seems to be an exaggeration.

TECHNIC OF INSULIN TREATMENT.—Insulin should be used with care, as it is a toxic product of which the exact nature and remote effects are as yet unknown (Chabrol). Furthermore, it is a double-edged weapon, for while it can lower the sugar content of the blood and of the urine, it can also bring on the symptoms of hypoglycemia.

It should be administered only under careful supervision, with close watching of the blood and urine, and the patient on a suitable diet.

I. Treatment of Severe Diabetes.—Two methods have so far been recommended in conducting insulin treatment.

1. *Chabanier* considers insulin as the essential remedy in serious diabetes, while dietary restriction is to be, in each particular case, as moderate as possible.

Insulin injections in sufficiently large and continuous doses transform the diabetic into an almost normal person, and he should be given as much carbohydrate as possible, as well as of fats and proteins.

This mode of procedure is held to present two advantages: That of facilitating restoration of the patient's weight and general condition, and that of lessening as much as possible the risk of symptoms from hypoglycemia.

On the other hand, this method leads to the use of very large doses of insulin.

2. The *American and Canadian investigators*, and, in France, *Gilbert, Baudoin and Chabrol*, consider insulin as simply an adjunct to a strict diet. To give up the dietary régime completely is not justified. Dieting always has its *raison d'être*, provided it be compatible with a gain in the patient's weight. This makes it possible to inject only restricted amounts of a drug which is costly and the remote effects of which cannot as yet be measured.

Below we outline in succession the technic of these two methods:

A. Chabanier Method.—(a) Begin by ascertaining the carbohydrate balance, the degree of glycosuria and, if possible, of the glycemia, before breakfast in order to determine the renal diabetes factor.

Let us first define the renal diabetes factor, which must not be confused with true renal diabetes.

True renal diabetes is characterized by the two following clinical features: A manifest contrast between the amount of the glycosuria and the low degree of glycemia, the latter being rather close to the physiologic amount, on the one hand, and on the other, a practically normal alimentary glycosuria test (one morning before breakfast the blood sugar is tested;

then, the patient having ingested 150 grams—5 ounces—of glucose, one ascertains one and one-half hours later what his alimentary glycemia is. Normally, there are found only slight variations before and after this test). In true renal diabetes, which is, however, of exceptional occurrence, it is dangerous to employ insulin.

The *renal diabetes factor in a true diabetic* arises from the fact that excess of blood sugar is not the only factor in glycosuria; individuals with a high blood sugar may have a relatively slight glycosuria, whilst others with less glycemia may have a much more pronounced glycosuria. There is thus another factor, of a renal order. In subjects placed on an identical diet, it will be found that, with an equal blood sugar content in the morning before breakfast, *e.g.*, 3 grams, the glycosuria is very variable according to the individual: One will show a glycosuria of 180 grams in twenty-four hours and another, of 30 grams only. The kidney seems to interpose a barrier of varying height to the passage of the glucose from the blood into the urine. In the first subject, there is a renal diabetes factor which is more marked than in the second.

This knowledge of the renal diabetes factor affords a basis on which to establish the maximum carbohydrate allowance to be given to the patient during the insulin treatment.

Indeed, in a given diabetic patient, on a given carbohydrate allowance and a given dosage of insulin injected, the glycosuria diminishes all the more rapidly in proportion as the renal diabetes factor is less marked. When the renal diabetes factor is but slightly marked, a diet relatively rich in carbohydrates may be instituted from the start and yet a rapid and complete fall of the glycosuria obtained. If the renal diabetes element is pronounced, a diet with less carbohydrate must be given from the outset.

For four or five days the patient is placed on a *diet containing 100 grams of carbohydrates.*

For example:

Breakfast.

Milk 100 grams.

Noon meal.

Meat 75 grams.

Potatoes 150 grams.

Green vegetables 200 grams.

Butter 30 grams.

Apples (fruit) 50 grams.

7 P.M.

Same as at noon.

The food is weighed in its raw state. The meat, well freed of fat, is to be roasted or broiled. The potatoes are boiled or baked in

their skins. The green vegetables are boiled. Butter is mixed with the various foods.

On the fifth day, the twenty-four hour urine is collected and tested for sugar; if possible, the blood sugar should also be determined in the morning before breakfast.

If, with a blood sugar content of 2 grams, 150 grams of sugar in the twenty-four hours are found in the urine, a very pronounced renal diabetes factor is known to be present.

If, with the same glycemia of 2 grams, there is found a glycosuria of 30 to 40 grams in the twenty-four hours, the renal diabetes element is relatively slight.

Similarly, if, with a blood sugar of 3 grams, there is a glycosuria of 60 grams in the twenty-four hours, the renal diabetes element is but slight.

If determination of the blood sugar has not been feasible, it may be considered that five days after the above régime a glycosuria of 200 grams points to a pronounced renal diabetes factor, while one of 30 to 40 grams points to a slight renal diabetes factor.

(b) Then start the insulin injections.

DOSAGE.—*In the adult*, 5 cubic centimeters of insulyl (Roussel) *immediately before* each of the two principal meals (including potatoes and sugar) by *slow intramuscular injections* or deep subcutaneous injections (in the sensitive, 0.01 gram of procaine may be added). Before injecting, one should make sure that the needle is not in a blood-vessel.

In severe diabetes, 5 cubic centimeters of insulyl three or even four times in the twenty-four hours may be added, with ingestion of carbohydrates (potatoes, milk, sugar) after each injection.

In children: 2 to 4 cubic centimeters of insulyl, according to age, before each of the principal meals.

(c) Concurrently institute an appropriate diet.

1. IF THE RENAL DIABETES FACTOR IS BUT SLIGHTLY MARKED, a diet containing 140 to 200 grams of carbohydrates should be given.

For example:

8 A.M.	
Milk	150 grams.
Noon.	
Meat	75 grams.
Potatoes	200 grams.
Green vegetables	250 grams.
Ordinary bread	40 grams.
Butter	30 grams.

7 P.M.
Same as at noon.

Or:

8 A.M.

2 eggs.

Noon.

Meat	75 grams.
Potatoes	100 grams.
Green vegetables	200 grams.
Macaroni or rice	60 grams.
Butter	30 grams.
Ordinary bread	30 grams.
Apples (fruit)	40 grams.

7 P.M.

Same as at noon.

A part or all of the potatoes may be replaced by any of the foods given below:

100 grams carbohydrate are furnished by:

Potatoes	100 grams.	Grapes	550 grams.
Rice	135 "	Apples, pears, peaches, apricots	700 "
Noodles, macaroni	150 "	Oranges	900 "
Flour	150 "	Strawberries	1100 "
Chocolate	160 "	Milk	2400 "
Peas, lentils, dried beans ..	175 "		
Bread	190 "		

These figures are, however, only approximate. Again, tolerance varies from one food to the other: One patient may tolerate perfectly the 100 grams of carbohydrates furnished by 500 grams of potatoes, while tolerating poorly the 100 grams supplied by 2400 cubic centimeters of milk.

To determine the quantity of fats and of proteins to be given, there is a very simple method, *viz.*, to weigh the patient daily. Watching the weight curve will show whether the patient is taking food in a rational manner.

2. IF THE RENAL DIABETES FACTOR IS MARKED, a diet containing only 100 to 110 grams of carbohydrates should be instituted.

For example, one may give the diet outlined above for the first five days of observation.

Or else:

8 A.M.

2 eggs.

Noon.

Meat	100 grams.
Green vegetables	250 grams.
Potatoes	150 grams.
Butter	40 grams.

7 P.M.

Same as at noon.

(d) Observe the patient during the treatment.

The following criteria are watched:

1. The acetonuria.
2. The glycosuria, every day or every second day.
3. The general condition and the body weight (patient to be weighed daily at the same hour).

Determination of the blood sugar may, if unavoidable, be omitted.

1. *Either the glycosuria decreases regularly and rapidly.* In the very great majority of cases the glycosuria rapidly diminishes and may fall to zero in four or five days; the acetonuria disappears in a few days, even though the food includes protein bodies and fats.

When the glycosuria reaches zero, the diet is gradually increased. For example, 50 grams of potatoes may be added to each meal, *i.e.*, 20 grams of carbohydrates in the twenty-four hours, and the food ration is thus increased, unless there is a return of the glycosuria.

The injections of insulin are to be continued for at least two weeks after the glycosuria has been reduced to zero.

2. *Or, the glycosuria, after having decreased, stays at a certain level.*

In this event one begins by reducing the carbohydrates by 20 grams; then, if this is not sufficient, another reduction is made after a few days, until the glycosuria has completely disappeared. Once this result has been obtained, the carbohydrates are gradually increased, as in the preceding instance.

The general condition (weight, strength) should, however, not be lost sight of during the period of carbohydrate restriction. If the return to health is seen to be hindered, it will be better to keep to the same ration rather than be anxious to eliminate the glycosuria.

(e) Duration of the Treatment.

Generally the first course of treatment comprises 42 injections, or 21 days. But results are often achieved before this time. In any event, prolonged series must be given and continued at least two weeks after the glycosuria has been reduced to zero.

After the course of treatment, a less abundant diet is to be instituted—about 50 grams of carbohydrates and 70 grams of fats and of proteins.

The urine is watched and an attempt made to increase the diet, unless glycosuria appears.

If the diabetic disturbances reappear or if the general condition is becoming worse, a second course of treatment, less prolonged than the first, should be given.

Chabanier proposes to have severe diabetics undergo a basal treatment carried out according to a schedule similar to that applied

in the treatment of syphilis: An initial heavy treatment with large doses and long continued, after which the patient is to be kept under observation clinically and physiologically, a fresh course of treatment being instituted as soon as any symptom indicating resumption of the course of the diabetes appears.

B. Method of Gilbert, Baudoin and Chabrol.—(a) **INSULIN DOSAGE.**—In diabetes with more or less impairment of nutrition, one begins by injecting 10 American units (Lilly) or 1 cubic centimeter of Roussel insulyl before the noon meal, without exceeding, during the first three or four days, 20 American units or 2 units of insulyl in twenty-four hours. In the adult, the dose may be increased up to 5 or 6 cubic centimeters of insulyl, taking into account the age, weight, etc.

The largest dose should be injected before the noon meal, and the patients ingest at noon the greater part of the carbohydrates allotted for the twenty-four hours; a smaller dose is to be injected before the evening meal. Occasionally, a third dose may be injected in the morning before breakfast; in this event, one must make sure that the urine always contains sugar at that time.

The dose is subject to modification according to the result of the uranalysis. The dose is rapidly reduced when the acetonuria has disappeared and the sugar content appreciably decreased.

(b) **DIET.**—At the start, only 50 to 100 grams of carbohydrates should be allowed, exclusively in the form of potatoes (which contain 20 per cent. of carbohydrate).

Later, other carbohydrate foods may take the place of the potatoes.

To determine the amount of proteins and fats required for the patient, he is weighed and the sugar and acetone curve compared with the weight curve. The essential point is that the patient should not lose, but should gain, weight, while the sugar and acetone show no increase.

If, as the weight increases the sugar and acetone also increase, 1 cubic centimeter of insulyl should be added at the noon and evening meals. These limits should not be exceeded; it is better to leave the patient for a long time on a diet than to subject him indefinitely to excessive doses of insulin.

If this proves insufficient, at the end of three or four days the carbohydrates should be slightly reduced, a supplementary ration of eggs or butter being, if necessary, allowed when the acetonuria is in process of diminution.

(c) **SUPERVISION OF THE PATIENT DURING THE TREATMENT.**—As a simple method of control, the authors mentioned advocate the following:

Fractional examination of the urine. This starts from the principle that apart from the exceptional cases of renal diabetes, the finding of glycosuria implies the existence of hyperglycemia; at the times during the day when the urine contains sugar, there is relatively little chance of causing the symptoms of hypoglycemia by the use of insulin, since the blood sugar is then in excess. The patients collect their urine at 8 A.M., noon, and 8 P.M., just before the three customary meals. They test it themselves by heating with an equal part of Fehling's solution. Insulin is used only if there is glycosuria.

(d) DURATION OF THE TREATMENT.—This is a question which is very hard to answer. There are as many variations in the treatment by insulin as there are modalities of diabetes.

The physician should be guided by the progress of the disease and the manner in which the patient carries out the dietetic instructions. One of Chabrol's patients was able to continue for more than six months a daily injection of 2 cubic centimeters of insulin, while another, less gravely ill, does well merely under a series of injections of 8 or 10 days every two months; she thus gains 1 to 2 kilograms in weight, which she partly loses again during the intervals.

II. Treatment of the Ill Effects Caused by Insulin.—Insulin may cause serum manifestations, such as urticaria.

The other mishaps are due to *hypoglycemia*. When insulin lowers the blood sugar below the normal figure of 1 gram per liter, *e.g.*, to near 0.7 gram, there results only restlessness and nervousness. At a slightly lower level, profuse sweating, pallor, and tachycardia are sometimes observed. The very serious mishaps, such as syncopal tendency and convulsions are observed only exceptionally when a marked hypoglycemia of an experimental type has been induced. To obviate these accidents, the dose should be graduated, under control by the urine, and carbohydrates given *immediately after* the injection.

The principal remedy for these mishaps is to take a few lumps of sugar in a glass of water, or, more rarely, an intravenous injection of 15 to 20 grams of glucose. One may also inject subcutaneously 0.001 gram ($\frac{1}{65}$ grain) of adrenalin, an antagonist to insulin.

If, four or five hours after the injection of insulin, the patient has incipient symptoms of hypoglycemia (physical depression or, especially, mental depression, sadness, tendency to tears, etc.), Chabanier advises lengthening the duration of the meals, in such manner as to have them last $1\frac{1}{2}$ to 2 hours after the injection.

Finally, in diabetics treated with insulin, the development of more or less extensive *edema* is in rare instances noted.

More often, however, hydremia is stated to be observed, only by the aid of the refractometer, and according to some observers, this retention of water is the main cause of the increase of weight observed in the course of insulin treatment.

[Administration of insulin calls for a preliminary study of the ability of the case to respond to dietetic treatment alone. L. Jonas and J. H. Musser, Jr. (*Amer. Jour. Med. Sci.*, April, 1924), describing their preliminary procedure in cases not under satisfactory therapeutic control, recognize, as the milder group of such cases, those with no diacetic acid or with only traces of it in the urine, but with sugar in the urine or with fasting blood-sugar above 0.15 per cent. Recognizing the normal caloric requirements as 11 to 14 calories per pound of body-weight at rest; 16 to 18 calories at light work, and 18 to 20 calories at moderate work, they first set about determining how far these caloric requirements can be met without the use of insulin. For this purpose, the patient is first placed on a *Diet No. 1*, providing a total of 700 calories per 100 pounds of normal body weight. The composition of this diet, which contains a total of 49 grams of protein, 46 grams of fat, and 23 grams of carbohydrate, is as follows:

Breakfast.—Grapefruit, 150 grams; eggs, 2; non-carbohydrate biscuits, 2, and coffee (usual amount).

Dinner.—Broth, 150 c.c.; lean meat, 100 grams; vegetables (5 per cent.), 100 grams; vegetables (10 per cent.), 100 grams; non-COH biscuits, 2, and tea or coffee.

Supper.—Egg, 1, with lettuce as salad; oatmeal, 50 grams; non-COH biscuits, 2, and coffee.

(To the extent that the patient's weight exceeds or falls below 100 pounds, corresponding quantitative changes are made in this diet, the weight taken being, however, not the patient's actual weight, but the normal weight for a person of his age, height and sex.)

If the patient is not sugar-free in three days on the above diet, insulin is indicated.

If he does become sugar-free, successively heavier diets are given—*Diets Nos. 2, 3* or finally *4*—until the caloric requirement for the patient's acidity and normal weight is being furnished or until sugar appears in the urine.

Diet No. 2, which provides a total of 1370 calories per 100 pounds of normal body-weight and contains 56 grams of protein, 104 grams of fat and 52 grams of carbohydrate, is as follows:

Breakfast.—Grapefruit, 150 grams; egg, 1; oatmeal, 100 grams; butter, 15 grams; cream, 20 c.c.; non-COH biscuits, 2, and coffee.

Dinner.—Broth, 150 c.c.; meat, 100 grams; vegetables (10 per cent.), 100 grams; vegetables (15 per cent.), 100 grams; cream (20 per cent.), 15 c.c.; butter, 15 grams; non-COH biscuits, 2, and tea or coffee.

Supper.—Eggs, 2; bacon, 15 grams; vegetables (10 per cent.), 100 grams; vegetables (5 per cent.), 100 grams; cream, 15 c.c.; butter, 15 grams, and non-COH biscuits, 2.

Similar additions in *Diets 3* and *4* bring the former to 1950 calories, 58 grams of protein, 156 grams of fat and 78 grams of carbohydrate, and the latter, to 2470 calories, 60 grams of protein, 202 of fat and 102 of carbohydrate. The protein is intended to remain stationary at 0.5 gram per pound of normal body weight.

When carbohydrate tolerance is reached (*i.e.*, sugar begins to appear in the urine) before the desired caloric requirement is furnished, fat may be increased in the diet to a maximal limit which amounts in *Diets 1* to *4*, respectively, to 70, 130, 184 and 240 grams. Appearance of diacetic acid in the urine in more than occasional traces demands, however, a diminution of the fat in the diet. If the caloric requirement is still not reached and if the patient is losing weight when the fat has been increased to the maximal limit for the protein and carbohydrate of the diet, insulin treatment is indicated.

If the patient is over the normal weight (except when such overweight is due to edema), not more than 10 calories per pound should be given until the weight has returned to normal. On the other hand, if the patient is greatly under weight, and the carbohydrate tolerance permits, the diet may be in excess of the caloric requirement, to encourage return to normal weight.

(The 5 per cent. group of vegetables—*i.e.*, containing 5 per cent. of carbohydrate—is as follows: Lettuce, cucumbers, spinach, asparagus, rhubarb, sauerkraut, beet greens, dandelion greens, Swiss chard, celery, tomatoes, Brussels sprouts, watercress, sea kale, okra, cauliflower, egg-plant, cabbage, radishes, leeks and string beans.

The 10 per cent. group includes: Pumpkins, turnips, kohlrabi, squash, beets, carrots, mushrooms, boiled oatmeal and onions; also, lemons, oranges, cranberries, strawberries, blackberries, gooseberries, peaches, pineapples, watermelon and green olives.

The 15 per cent. group includes: Green peas, artichokes, parsnips and canned lima beans; also, apples, pears, apricots, blueberries, cherries, currants, raspberries and huckleberries.)

Although some observers have published evidence to the effect that it is sometimes possible for a small proportion of insulin to be absorbed when used by the mouth or by inunction, these routes of administration are altogether too uncertain and wasteful to be clinically available.

As described by Jonas and Musser, the dose of insulin is that required to enable the patient to utilize the carbohydrate necessary for a calorically adequate diet, remaining free from glycosuria and diacetic acid in the urine, and retain a fasting blood sugar below 0.15 per cent. One unit of insulin will care for about 2 grams of carbohydrate in excess of the patient's own carbohydrate tolerance.

The drug should be given twenty minutes before the carbohydrate which it is to balance. The proper dose may be determined thus:

The diet having been increased to the highest fat-carbohydrate content possible without glycosuria, a small dose of insulin is given—5 units before breakfast. The fat is then increased by 20 grams and the carbohydrate by 10 grams a day until sugar appears in the urine. The urine passed between each meal is examined and the attempt made to eliminate glycosuria by redistribution of the carbohydrate with relation to the insulin dosage. The dose of insulin is next increased by 5 or 10 units, and when sugar disappears from the urine the fat and carbohydrate in the diet are further increased. Alternating increases of insulin and of diet are continued until the required caloric intake is reached.

In ambulant patients, if no more than 15 units a day are required to keep the patient sugar-free, the remedy may be given exclusively before breakfast. If a larger amount is necessary, two doses should be given, morning and evening, up to 30 units at each injection, with the bulk of the carbohydrate intake divided between the breakfast and supper. If over 60 units are given, it is usually necessary to inject insulin before each meal. Where, for any reason, insulin is to be discontinued, the patient must return to a low-caloric diet, within his own tolerance, and curtail all physical activities.

The earlier symptoms of *hypoglycemia* consist of sudden, pronounced hunger; sudden weakness or fatigue; restlessness or nervousness, often described by the patient as a feeling of "inward trembling;" pallor or flushing of the face; dilated pupils, and increased pulse rate.

The more advanced symptoms comprise sweating, tremor, motor incoordination, anxiety and excitement, vertigo, diplopia, aphasia and confusion, convulsions, collapse, unconsciousness and death.

The occurrence of hypoglycemic symptoms may be favored by the taking of insulin too long before a meal; by failure of food absorption because of vomiting, diarrhea or delayed digestion, or by muscular exercise, which may increase the utilization of glucose in the body. For these reasons, the diabetic taking insulin should always carry about with him some form of carbohydrate for prompt use in case of need.—Tr.]

TREATMENT OF DIFFERENT CLINICAL FORMS OF UNCOMPLICATED DIABETES.

I.—ORDINARY DIABETES WITHOUT MALNUTRITION.

—A NEURO-ARTHRITIC CASE WITH MODERATE GLYCOSURIA (20 TO 60 GRAMS), WITHOUT ACETONEMIA, IN AN ADULT OF FORTY YEARS, SLIGHTLY OVERWEIGHT.

A.—*Diet.*

General diabetic diet with restriction of carbohydrates and reduction of the total amount. The diet should be planned for the particular case after direct determination of the patient's carbohydrate tolerance. If need be, and if possible, there should be interspersed one to three-day periods of more or less stringent fast, with or without purgation (sodium sulphate).

B.—*General Hygienic Measures.*

As much as possible, life in the open air, with avoidance of sedentary pursuits; temperate climates in general and a warm climate in the winter.

(a) *Varied physical exercise:* Walking, billiards, horseback or bicycle riding, gymnastics, etc., in due moderation.

(b) *Careful general and special cleansing measures,* in particular as regards the mouth, teeth and genital region.

(c) *Daily hydrotherapy* (lukewarm sponge bath, douche or pack) followed by a general rub with the hair-mit or with flannel moistened with eau de Cologne or some alcoholic-aromatic liniment.

C.—*Medicinal Treatment.*

Employed only if the diet and regulation of exercise fail to dispel the glycosuria and other diabetic symptoms:

First week:

(a) Vichy water (Grande-Grille), one large glassful, warm, one-half hour before meals.

(b) Before retiring, in a hot beverage without sugar or sweetened with saccharin, lithium benzoate, 0.3 gram (5 grains).

Second week:

Quinine valerate, 0.2 gram (3 grains) before the noon and evening meals.

Third week:

℞ Sodii phosphatis,
Sodii bicarbonatis,
Pancreatiniāā 0.4 gram (gr. vj).

Pone in cachet. No. i. Da tal. No. xv.

Sig.: One cachet one-half hour before lunch and dinner.

II.—DIABETES WITH PLETHORA.—A NEURO-ARTHRITIC CASE WITH AVERAGE GLYCOSURIA, WITHOUT ACETONEMIA, IN AN ADULT, WITH HEPATIC CONGESTION, PLETHORA AND HEMORRHOIDS, AND GREATLY OVERWEIGHT.

A.—Diet.

(a) Begin the treatment with two or three days of complete or almost complete fast: Vichy water, unsweetened weak tea *ad libitum*, two eggs, 100 grams of boiled potatoes; purgation with 50 grams ($1\frac{1}{2}$ ounces) of sodium sulphate, $\frac{1}{2}$ bottle of Hunyadi, or the equivalent.

(b) Next institute the general diabetic diet (previously detailed), aiming especially to reduce the total food allowance to approximately 25 calories per kilogram, with continuous observation of the weight (weighings twice weekly) (*the arthritic can and must be reduced*) and repeated uranalyses.

(c) Intersperse fast or semi-fast days, with or without purgation.

B.—General Hygienic Measures.

As in I, but with addition of:

(d) *Massage beneath the douche* (as used at Aix), over the whole body, but especially the abdomen.

(e) *Systematic mechanotherapy*: Exercises, Zander apparatus, etc.

C.—Medicinal Treatment, for ten to fifteen days in each month:

℞ Sodii bicarbonatis,

Sodii citratis,

Sodii sulphatisāā 20 grams (3v);

Sodii salicylatis 10 grams (3iiss).

M. Sig.: One to two teaspoonfuls in the *morning* in a 200 c.c. glassful of warm Vichy water (Hôpital).

The amount should be regulated according to the stools. It is well to obtain one or two copious bilious stools.

Or: Carlsbad salts, one teaspoonful in the morning in a glassful of warm Vichy water.

III.—NERVOUS DIABETES.—WITH OVERWORK, NERVOUS ERETHISM, EXCESSIVE IRRITABILITY, IRREGULAR DIABETIC SYMPTOMS, AND SATISFACTORY GENERAL NUTRITION.

A.—Diet.

General diet, relatively liberal as to carbohydrates: According to tolerance, allow 50 to 80 grams of bread, and a little fruit.

From time to time, a fast day with purgation.

B.—General Hygienic Measures.

(a) *Exercise in strict moderation*: Walking or bicycle riding, never to the point of fatigue.

(b) As in I.

(c) *Hydrotherapy*, tepid or cool, very brief (a few seconds only), followed by a general stimulating rub with a dilute turpentine liniment.

(d) *General stimulating massage* (tapotement, vibrations, effleurage, etc.).

C.—*Medicinal Treatment.*

For ten days:

R Strychninæ sulphatis	0.04-0.06	gram (gr. $\frac{1}{2}$ -i);
Sodii arsenatis (N. F.)	0.1	gram (gr. iss);
Sodii glycerophosphatis (N. F.)	10	grams (3iiss);
Extracti cinchonæ	20	grams (3v);
Spiritus vini vitis	40	c.c. (f3x);
Glycerini	q. s. ad 150	c.c. (f3v).

M. Sig.: One teaspoonful in water three times a day with the meals.

For the next ten days:

R Codeinæ	0.01	gram (gr. $\frac{1}{6}$);
Kolæ pulveris (N. F.)	0.1	gram (gr. iss);
Fluidextracti kolæ (N. F.)	0.3	c.c. (m v).

Ft. pil. No. i. Da tal. No. xl.

Sig.: Four pills a day.

IV.—DIABETES WITH LOSS OF WEIGHT.—IN AN ADULT WITH PRONOUNCED GLYCOSURIA (over 100 GRAMS); MARKED WASTING.

A.—*Insulin Treatment.*

B.—*Diet.*

Mixed diet with relative increase of fats (160 grams), a sufficiently large allowance of protein (120 grams), an appreciable amount of carbohydrates (100 grams), alcohol in reasonable amount, and an average allowance of 35 to 40 calories per kilogram.

Fat should be given in the form of fresh butter, butter and oil seasoning, olive oil or codliver oil as such, fat foods (fat meats, goose, pork), fat fish (mackerel, herring), eggs, milk, cheese, nuts, filberts, olives and almonds. *The fat allowance should be regulated according to the patient's tolerance, as shown through the stools, weight, acetonuria and acidosis.*

Protein is to be given in the form of meat (red or white), fowl, fish and eggs; 300 to 400 grams of meat or fish and five or six eggs ordinarily constitute, when well borne by the digestive system, a useful and sufficient allowance.

Carbohydrates will be borne to the amount of about 100 grams in the form of bread (100 grams), potatoes and fruits; they are definitely indicated, in even larger amounts, along with reduction of fats, where there is acetonuria (as shown by Gerhardt's test).

Alcohol may be allowed in the form of red wine ($\frac{1}{2}$ liter) and old brandy or whiskey (40 to 60 cubic centimeters), manifestly facilitating the digestion of the fats.

C.—*General Hygienic Measures.*

- (a) *At least comparative rest* in bed or on a couch; short walks.
- (b) Cleansing measures, as in I.
- (c) *Hydrotherapy*, tepid or cool, very brief, followed by a rub.
- (d) *General stimulating massage.*

D.—*Medicinal Treatment.*

Alkalies, to reduce the chances of coma: Sodium bicarbonate, 2 to 5 grams (30 to 75 grains) in a powder to be taken after meals.

Also:

- (a) *For ten days.*

The strychnine, arsenic, glycerophosphate and cinchona combination formulated above.

- (b) *For the next ten days:*

℞ Extracti opii (N. F.)	0.01 gram (gr. $\frac{1}{6}$);
Extracti valerianæ	0.05 gram (gr. $\frac{3}{4}$);
Calcii phosphatis	0.1 gram (gr. iss).
Ft. pil. No. i. Da tal. No. xxx.	
Sig.: Three pills daily.	

- (c) *For the last ten days:*

A daily injection of 5 to 10 cubic centimeters ($2\frac{1}{2}$ to 5 fluidrams) of *sterilized camphor in oil*, carried out with the most strict aseptic precautions.

V.—DIABETES WITH TUBERCULOSIS.—As is well known, tuberculosis constitutes a serious and usually incurable complication of diabetes. Accordingly, it is advisable to detect its threatened advent in the stage of pretuberculosis, characterized chiefly by demineralization, and to treat it in this early stage as previously described (see *Pulmonary Tuberculosis*).

Established tuberculosis—in addition to the special symptomatic indications (cough, expectoration, dyspnea, etc.), which present nothing unusual in these cases and should be treated as described in the section on *Diseases of the Respiratory Tract*—calls, in a general way, for the remineralizing, recalcifying treatment. In general, I adopt the procedure advocated by Ferrier and Sargent, but with much less stringency as regards fat restriction. I allow a rather free use of fresh, unsplit fats, as free as possible of fatty acids (fresh butter, fresh cream, olive oil, codliver oil, goose grease), with the following three stipulations, *viz.*: (1) That, as already said, these fatty substances shall be fresh and not rancid; (2) that the appetite and gastric digestion are not disturbed by these fats, and (3) that the fats are properly digested in the intestines (absence of fat from the stools).

A.—*Diet*.—Meat broths or chicken broths, with the fat thoroughly removed and with the addition of eggs, chopped chicken meat, somatose, etc.

Lean ham, smoked tongue, oysters, olives, broiled or roasted meats without sauce, liver, kidneys, sweetbread, brains.

Boiled fish, with addition of fresh butter.

Boiled eggs.

Potatoes and (according to tolerance) split peas, beans, lentils.

Green vegetables, cabbage, chicory, leeks, celery, spinach, etc.

Almonds, nuts, filberts.

Cheese: Edam, Gruyère, Camembert.

Fresh butter, olive oil or goose grease to be used in reasonable amounts in the preparation of the food.

Acid foods to be avoided (acid fruits or vegetables, chow-chow, vinegar, sorrel, lemons, etc.).

B.—*General Hygienic Measures*.

Those given under IV.

C.—*Medicinal Treatment*.

(a) For ten days in each month:

The strychnine, arsenic, glycerophosphate and cinchona combination already formulated.

(b) For the next ten days:

Daily injection of a 0.05 gram ($\frac{3}{4}$ grain) ampule of sodium cacodylate.

(c) For the last ten days:

R. Magnesii oxidi	0.05 gram (gr. $\frac{3}{4}$);
Sodii chloridi	0.15 gram (gr. iiss);
Calcii carbonatis	0.3 gram (gr. v);
Calcii phosphatis (tribasic)	0.5 gram (gr. viij).

Pone in cachet. No. i. Da tal. No. xxx.

Sig.: Three cachets daily in the middle of the meals.

VI.—**DIABETES WITH ALBUMINURIA**.—Castaigne writes the following:

"In this connection the albuminuria of chronic nephritis must be distinguished from true diabetic albuminuria.

"In the case of *chronic nephritis*, excess of meat in the diet should be avoided. Von Noorden recommends reduction of the customary intake of fluids, with allowance, if need be, of short periods of greater freedom in the use of fluids. As for milk, it should not be given in too large an amount, and in any case, its effect on the glycosuria should be watched. Von Noorden lays stress on the importance of watching the heart, which very often presents evidences of weaken-

ing. In these cases the diet is decided upon by the physician after a groping process, and it is often hard to determine just what the diet should be.

"In the event of true *diabetic albuminuria*, the cause of this albuminuria should be sought: Digestive disorder, hepatic disorder, gastric disorder, phosphaturia, etc. Sometimes the antidiabetic diet suffices to abolish this albuminuria; it is very important to seek the cause of the albuminuria, for if its action persists indefinitely, chronic nephritis may develop."

VII.—DIABETES WITH NERVOUS COMPLICATIONS.—

Among the nervous conditions witnessed are *neuralgias*, of which sciatica is the most frequent.

Hot air treatment, sulphur baths, the galvanic current and the static effluve prove useful, as do also light baths.

The antineuralgic and antiglycosuric remedies available are: Quinine (valerate or hydrobromide), the bromides, antipyrin and opium.

There are often seen conditions of true *neuritis* which, with reference to the lower extremities, are accompanied by paresis and, because of their severity, deserve the appellation "pseudotabetic." Hot air treatments, local sulphur baths, local evaporations of methyl chloride from cotton, massage, electricity, and carbonated baths, combined with analgesic drugs, may allay suffering while improving motion of the part.

A *neurasthenic state* is often associated with diabetes: Arsenical medication (cacodylate injections), the glycerophosphates, residence at an elevation and suggestion may be employed in conjunction with the treatment of the glycosuria.

VIII.—DIABETIC COMA.—Diabetic coma is the most serious of the complications of diabetes. It is responsible for over one-half of the deaths from the disease. An extremely large number of articles has been written on it of late. While not much progress has been made from the curative standpoint [previous to insulin], many definite facts have been accumulated which permit of reducing its frequency and gravity.

Neither acidosis, nor acetonemia, nor ammoniuria is the cause of coma, but these conditions are valuable earmarks of it, and while there by no means exists any absolute parallelism between acidosis, acetonemia and coma, the agencies which reduce acidosis and acetonemia also act favorably on the predisposition to coma.

All observers, from Bouchardat on, have found on the basis of clinical experience:

1. That a diet too rich in proteins, particularly animal proteins (meat), favors acidosis and the occurrence of coma.
2. That the same is true of a diet too rich in fats, the most active generators of ketone bodies.
3. That the carbohydrates, to the extent that they are assimilated, are possessed of a manifest preventive influence against acidosis and ketone formation, and that, as Bouchardat had already pointed out, the prodromal signs of coma are often seen to appear in a patient placed on a very stringent diet and thereby rendered sugar-free.

Upon these well-established and fundamental facts have been erected a number of rather contradictory interpretations.

The following essential features are to be kept in mind:

1. *That stringent diets are attended with much danger in the long run.*
2. *That there is advantage in reducing the total food intake of diabetics (see above), and more especially, of the allowance of fats and proteins (of animal origin, in particular).*
3. *That there is always advantage in including in the diet the maximum of carbohydrates which the subject is able to assimilate.*

In short, the diet of diabetics, particularly those predisposed to coma, should be a mixed diet containing a moderate quantity of proteins and fats derived mainly from milk (and its derivatives: butter, fresh cheeses), eggs, vegetables, fruits (walnuts, filberts, almonds), and the tolerated amount of carbohydrates.

If the condition is one of simple diabetes, the foregoing rules are sufficient.

If loss of weight coexists, the allowance of carbohydrates and fats should be increased and a little sugar permitted to occur in the urine.

If the case is one of mixed diabetes, the treatment should be opportunely interspersed with days of milk or vegetable diet or of restriction to fluids (with or without sweetened tea and vegetable broth) with purgation (Guelpa).

The diabetic predisposed to acidosis should carefully avoid all overwork and excesses and all aggressive drug treatment. The pharmaceutic agents prescribed should be practically limited to the alkalies and purgatives.

Treatment of diabetic coma is called for in practice under two distinct circumstances:

1. When preliminary evidences are present (positive Gerhardt's test, hyperacidity of the urine, dyspneic, nervous or digestive manifestations, etc.). Under these conditions *preventive treatment* is indicated.

2. When coma has already set in. *Curative measures* are then called for.

A. Preventive treatment (when preliminary evidences are present) :

The four measures to be taken are:

1. Give injections of insulin.

The triumph of insulin is here witnessed. Success, however, depends upon the promptness of intervention. The remedy must, as much as possible, be begun in the period of somnolence preceding coma.

In the presence of coma, the attendant quickly makes certain that Gerhardt's test of the urine is positive; an approximate idea of the degree of glycosuria is then sought.

Next, an injection of insulin, generally subcutaneous, is given. Ten American units (Lilly) or 1 cubic centimeter of insulyl Roussel are injected every hour, up to four doses. The intervals are then lengthened, so that six to eight doses shall have been given in the twenty-four hours.

Chabanier and Foster advocate much larger doses: 40 units or their equivalent at one time. Five large daily injections, up to a total of 250 American units, may thus be given.

2. Active purgation, preferably with a saline purgative, such as 40 or 50 grams ($1\frac{1}{3}$ to $1\frac{2}{3}$ ounces) of sodium sulphate or the equivalent amount of a purgative mineral water.

3. A milk and carbohydrate diet; an extra amount of carbohydrates must be given, as the blood sugar must be kept at a high level, *e.g.*, 2 to 3 liters (quarts) of skimmed milk with potatoes, rice, and fruit jelly. Some even advise glycerin (50 to 60 grams) and alcohol (brandy, 60 to 100 grams; red wine, two-thirds bottle) or, more simply, orange juice or simple syrup.

If the patient is unable to drink, he should be given after each insulin injection glucose solution (30 per cent.) either by rectal drip or intravenously. This should be alternated with a bicarbonate drip.

4. Alkalies in large doses: 30 grams (1 ounce), then 20, 15 and 10 grams (5, 4 and $2\frac{1}{2}$ drams) of sodium bicarbonate a day during and after meals, regulated according to Gerhardt's test, which should become negative as a result.

If required, intravenous injections of sodium bicarbonate, 10 to 30 grams ($\frac{1}{3}$ to 1 ounce), may be given as described below.

If the symptoms definitely improve, the patient should be brought back at the end of a week, feeling one's way gradually, to a moderate mixed diet of the type previously mentioned, with progressive restoration of cream, nuts (walnuts, filberts, almonds), vegetables, eggs and meat, and consentaneous reduction of the carbohydrates.

B. Curative treatment (when coma has set in):

The time-honored treatment, which yielded a few exceptional cases of recovery recorded previous to the use of insulin, may be summed up in two words: **Alkaline medication.**

Sodium bicarbonate is administered in very large doses: 60, 80, 100 grams (2, 2 $\frac{2}{3}$, 3 $\frac{1}{3}$ ounces) or more *by the mouth and intravenously.*

By the mouth.—Sodium bicarbonate should be given freely in teaspoonful doses every hour, or even every half hour, in water, milk, or other fluids.

Intravenous administration.—Many kinds of solutions, varying greatly in strength, have been recommended—from 17 grams to the liter (Lépine) to 80 grams to the liter (Sicard). The weaker solution mentioned would seem to require the injection of very excessive amounts of fluid (1 $\frac{1}{2}$ to 2 liters), while that last mentioned appears too concentrated. Preference should be given to solutions of intermediate concentration, such as 30 to 50:1000, which have given curative results in some cases of Marcel Labbé and Magnus-Lévy.

The following formula (Labbé) seems deserving of recommendation:

R Sodii bicarbonatis	30 grams (℥j);
Sodii chloridi	6 grams (℥iiss);
Aquæ destillatæ	1 liter (℥jxxxiv).—S.

The solution should be sterilized in the autoclave or over the open flame by boiling for fifteen minutes in a flask stoppered with cotton.

In the presence of chloride retention, levulose, 15 to 25 grams ($\frac{1}{2}$ to $\frac{5}{8}$ ounce), might be substituted for the sodium chloride.

From one-half to one liter (17 to 34 fluidounces) of the solution is to be injected in twenty-four hours.

It is advisable to administer it rather slowly (fifteen to thirty minutes). The mode of procedure presents no special features.

The injection is generally tolerated without unpleasant results. At times it leads to diarrhea, amenable to opium; to edema through aggravation of chloride retention, if present, indicating strictly chloride-free treatment; to general symptoms, *viz.*, headache, vomiting, convulsions and even rapid death, which have seemed to me to relate chiefly to cases in which a large volume (2 liters or more) of fluid had been introduced.

The results in the past have been as follows:

Exceptionally (cases so few as to be specially recorded), there have been witnessed in twelve hours rapid improvement, normal sleep and recovery. Less rarely: Temporary improvement, with the lethal termination postponed for twenty-four hours to a few days. In the majority of instances, the treatment has no material effect. Exceptionally, indeed, rapid aggravation and death have occurred.

The results are, in the aggregate, very poor.

Insulin Treatment.—In long established coma, *intravenous injections* of insulyl may be given without danger. One injects *very slowly* $2\frac{1}{2}$ cubic centimeters of insulyl Roussel, preceded, if possible, with an intramuscular injection of 5 cubic centimeters of the same preparation.

Any of the following auxiliary measures that may be deemed opportune may be tried in addition:

Oxygen inhalations, ozonization, and even hypodermic oxygen injections.

Sodium citrate in large doses, 20 to 30 grams ($\frac{2}{3}$ to 1 ounce), combined with or substituted for the sodium bicarbonate.

Camphor in oil, caffeine, strychnine.

As for the **subsequent diet** in the event of recovery, one should begin with a milk diet combined with alkaline medication in large doses and work up again through the dietetic series previously referred to. Frequent periods of carbohydrate diet with purgation are advisable.

[In actually threatening or developed coma, Jonas and Musser (*loc. cit.*) have the patient kept in bed and warm, with the bowels moved by one or more enemas. The stomach is to be freed of indigestible food, and the treatment is begun with gastric lavage in adults when in doubt, and in all cases in children. Digitalis is given, together with caffeine subcutaneously or as black coffee by rectum. A salient feature of the treatment is the giving of 1 liter of liquids in each six hours, to be taken slowly and hot, in the form of coffee, tea, thin broths and water. Twenty grams of glucose are given by mouth, if possible, and at the same time, hypodermically, 20 to 50 units of insulin. Glucose, 15 grams, and insulin, 10 to 30 units, are then continued every third hour unless sugar disappears from the urine. If the patient is unconscious and cannot take glucose by mouth, a 5 per cent. solution of it is given by continuous enteroclysis, and the insulin hypodermically, as above mentioned. Or, 5 per cent. glucose solution containing 10 units of insulin to the pint may be given *intravenously*.

In giving large doses of insulin in coma cases, it has been deemed necessary that sugar be excreted continuously in the urine, as evidence that the blood sugar is not falling below normal. The urine should therefore be collected and examined at intervals of one or two hours.

Even in advanced coma, when uncomplicated by other morbid conditions, recovery nearly always occurs under repeated injections of insulin in conjunction with a sufficient amount of glucose to obviate hypoglycemia.—Tr.]

IX.—SURGERY IN DIABETES.—This important question has been discussed by Marcel Labbé as follows:

The danger of operative work in diabetes is due to two main causes: (1) The **hyperglycemia**, which favors suppuration, and especially (2) **acidosis**, which brings on post-operative coma.

Suppuration retards recovery, but is not generally fatal. It may be combated by appropriate treatment directed to overcoming the hyperglycemia, *viz.*, reduction of the carbohydrate intake.

Acidosis is a much more serious threat; it is the cause of death in many diabetics. Death occurs in a few hours, in one day, or sometimes later, after a few days. Various conditions exert an influence on post-operative acidosis, *viz.*, the form of diabetes, the kind of operation, the anesthetic used and the treatment.

Form of Diabetes.—In diabetes with emaciation and acidosis, even the slightest operations are exceptionally serious. In diabetics without emaciation but going through an exacerbation of acidosis, the danger is likewise very great, but the resistance is better. In diabetics without emaciation and free of acidosis, coma is generally not to be feared.

The **kind and severity of the operation** have a bearing on the danger of acidosis, severe operative trauma and prolonged operations being plainly attended with the greater risk.

As a matter of fact, however, it is less the knife than the **anesthetic** which introduces the element of risk into operation in a diabetic. The most dangerous anesthetic is chloroform: It may bring on acidosis even in diabetics without emaciation; it inevitably results in death in diabetics with emaciation and acidosis. Danger from it is also to be apprehended in patients with lesions of the liver. Ether, despite certain writings on the subject, is almost as dangerous as chloroform. General anesthesia with ethyl chloride, even when prolonged, is better borne by diabetics; but one should nevertheless prefer to it, when possible, lumbar spinal anesthesia and especially local anesthesia, which is the procedure of choice.

Any operation in a diabetic, whether of an emergency nature or not, must be preceded by a course of injections of insulin. If the operation is of the emergency type, large doses are warranted, such as 5 cubic centimeters of insulyl or its equivalent intramuscularly, repeated four or five times in the twenty-four hours.

Any operation in a diabetic, unless it be an emergency operation, must, in addition, be preceded by pre-operative treatment directed against the hyperglycemia and acidosis: 1. Against hyperglycemia without acidosis, a mixed diet with but little meat and reduction of the carbohydrates. 2. Against acidosis, a diet of dry vegetables, or of oatmeal, or of milk, with administration of sodium bicarbonate. The usual pre-operative reduction of diet should be avoided, as it may aggravate the acidosis. Before the operation the patient should be given a large dose—40 grams ($1\frac{1}{3}$ ounces)—of sodium bicarbonate.

Similarly, **after the operation**, sodium bicarbonate should be given by the mouth or by intravenous injection (up to 100 grams— $3\frac{1}{3}$ ounces—if the acidosis is very marked). The alkaline treatment, combined with a diet of dried vegetables, oatmeal and milk, should be continued thereafter until the tests for acidosis have become entirely negative.

Many practitioners and surgeons do not approve of the omission of the pre-operative fast and prescribe, on the contrary, one or two days of fast and purgation, in accordance with Guelpa's procedure.

[Insulin has proven of great value as a preventive of the serious complications frequently attending surgical operations in diabetes. If one can start with insulin before operation one may be reasonably sure that the patient will not die of diabetes (N. B. Foster). When an operation becomes necessary in a case of diabetes adequately controlled by diet, sufficient insulin should be given to keep the urine free of sugar and acetone until the patient recovers. In more severe cases, already under insulin, the daily dose must be increased (Insulin Committee).]

TREATMENT OF COMPLICATIONS.

X.—DIABETIC GANGRENE.—The *prophylaxis* of gangrene in diabetics is based on the most painstaking care of the skin and mucous membranes by asepsis and antisepsis.

Gangrene is feared more particularly in diabetics with glycosuria of high degree, with depressed nervous system, leading a sedentary life or confined to bed, or with high grade albuminuria or arteriosclerosis. The supervision of some accidental infection (influenza

or one of the eruptive fevers) or the occurrence of traumatism should lead to additional apprehension of the production of necrosis, in which diabetes and obliterating arteritis generally participate.

Insulin injections constitute the most effective treatment.

The local use of *superheated air* is one of the best measures. An apparatus is used such as will supply a stream of air at a temperature of over 100° C. (212° F.) to be directed over the tissues becoming gangrenous; when the condition is one of ischemic gangrene through arteritis or thrombosis, an attempt may be made to reestablish the local circulation if it is not already too seriously compromised.

With temperatures that may be as high as several hundred degrees Centigrade, destruction of the tissues is completed where there is no hope of maintaining viability of the cells; the moist gangrene is thus immediately converted into a mummified condition from which absorption of toxic material and extension of anaërobic infection no longer take place. Striking cases of recovery under this measure have been reported, in particular by Dieulafoy.

In the intervals between sittings, the part in process of gangrenous transformation may be dressed with powdered zinc peroxide, Lucas-Championnière's powder, or thymol iodide.

When such treatment fails to check the advance of a rapidly progressive gangrene, one should hasten to perform an *amputation* at a sufficient distance from the gangrenous portion. It is especially where the diabetic patient exhibits a high degree of arteriosclerosis (arteries more or less completely calcified) that amputation constitutes the only recourse.

In deciding upon operation, account should be taken of the permeability of the arteries, as studied with the oscillatory sphygmomanometer. The amputation should be carried out only in healthy tissue, sufficiently supplied with blood, in order that the stump may heal properly. Time should not be sacrificed and not too much hesitation indulged in if a satisfactory result is to be obtained.

In conjunction with the local measures, diabetics threatened with gangrene should be given *general treatment* of a strongly stimulating nature and calculated to reduce the glycosuria as much as possible.

With the alkalies in large dosage should be combined extract of cinchona, phosphoric acid, strychnine, black coffee, and the oatmeal cure, which may or may not be alternated with a few days of fast and purgation.

XI.—DIABETES WITH SKIN COMPLICATIONS.—The diabetids or skin disturbances that develop among diabetics are in the

majority of instances dependent upon the glycosuria itself, and the best way to prevent and treat them is to reduce or eliminate the sugar. Local measures are, however, also called for.

The suppurative affections are complications dependent upon the facility afforded bacteria to flourish in media containing sugar. Aside from the treatment of the glycosuria, asepsis of the skin is also indispensable.

Diabetids.—The erythematous eruptions, the intertrigo and the frequently accompanying itching which, because of its situation beneath the breasts and especially at the vulva, constitutes so distressing a complication, vary in their incidence inversely with the precautions taken as to local cleanliness. Local ablutions morning and evening with plain water or with starch or bran water prepared just before use, or a solution of boric acid or sodium borate; frequent bathing in water to which starch and sodium carbonate have been added, and the use of powders of sterilized talc, bismuth, or zinc peroxide, are useful prophylactic procedures.

When itching is present, a wash, or better, local application with absorbent cotton of a 2 per cent. solution of chloral hydrate, should be prescribed.

If the itching is obstinate, daily applications of silver nitrate solutions of increasing strength, 1 to 5 per cent., or of a 2 per cent. solution of stovaine, should be employed.

In the intervals between the local washings or applications, the parts should be kept apart by absorbent, antiseptic powders, with avoidance, however, of irritating antiseptics such as iodoform and menthol.

For the night time, ointments of zinc oxide with cocaine or phenol may be used:

℞ Phenolis	0.25 gram (gr. iv);
vel Stovainæ	0.5 gram (gr. viij);
Zinci oxidi	3 grams (gr. xlv);
Adipis lanæ hydrosi,	
Petrolati	āā 15 grams (℥ss).—M.

Physical agencies such as electric immersion baths, the static effluve and high frequency may be also of service for the treatment of itching.

The most effectual treatment, however, consists of *injections of insulin*.

Meanwhile, irritability of the nervous system should be allayed by tepid hydrotherapeutic measures and by internal administration of alkali bromides, monobromated camphor, and valerian and its derivatives.

Diabetids of the glans penis, which may end in the production of phimosis, are less persistent where the patient takes care after each act of micturition to wash the glans and prepuce in order to remove from them the last few drops of sugar-containing urine, and applies a layer of talc or desiccant powder over the mucous membrane.

In women, daily vaginal injections should be ordered, to be carried out with great care and with addition to the water of an antiseptic such as coaltar, formaldehyde solution, etc.

[Infections of all kinds, including those of the skin, in diabetics show a tendency to reduce carbohydrate tolerance and promote acidosis. Under these conditions *insulin* is of great value in maintaining normal metabolism while the infection is being combated by the system. Where insulin has already been in use, a greatly increased dosage is temporarily required. Wilder reports 34 cases complicated by severe infection with but 3 fatalities, the latter due to toxemia and not to acidosis.—Tr.]

XII.—DIABETES IN CHILDREN.—In this type of case, a fatal termination is still the rule. The cured cases are so few that they are individually placed on record. Lereboullet and Labbé have each reported one such case. I have personally observed two cases.

Treatment, at the best, can only slow the course of the disease. It does not differ from that indicated in the adult; it is merely much more difficult to apply.

The regulations as to diet are the same.

Fortunately, in late years, the treatment of infantile diabetes with insulin has rendered its prognosis less unfavorable. Insulin must be injected as soon as the disease appears in a child.

Other drugs are of secondary importance and should be used only sparingly. They consist mainly of the arsenicals, phosphates and alkalies. The possibility of congenital syphilis should always be thought of and, if necessary, antisyphilitic treatment with mercury (inunctions, suppositories) or the arsphenamins (cautiously) prescribed.

General hygiene should, of course, be attended to very carefully.

[*Insulin* has given striking results in diabetic children, many of whom have been enabled by it to develop and play in a normal manner. According to Fitz and Murphy, insulin should be given in all cases in children; in fact, in all persons under 40.

The insulin treatment in children is conducted along the same lines as in adults, but is rendered somewhat more difficult by the greater severity of the disease in youth, the greater susceptibility

to acidosis and infections, the tendency to react unfavorably to high fat and low carbohydrate diets, and the greater readiness with which they develop insulin shock, owing to their lower blood and fluid volumes, which reduce the amount of free glucose available to offset the insulin. It is advised that in children small divided doses rather than a large single dose be given, and that increase in dosage be cautious.

As regards the diet, children require 1 gram of protein per pound of body-weight, instead of 0.5 gram, as in adults. The normal caloric requirement is also greater in children, being given by Jonas and Musser as 23 calories per pound at twelve years, 31 calories at six years, and 36 calories at two years. R. M. Wilder (*Minn. Med.*, Sept., 1923) gives also 2 grams of carbohydrate per kilogram (2.2 pounds) of body-weight, and enough fat to provide adequate calories. A six-year old boy weighing 20 kilograms might thus be given 40 grams each of protein and carbohydrate and 100 grams of fat, represented by 500 cubic centimeters of 20 per cent. cream, 300 cubic centimeters of skimmed milk and the whites of 4 eggs. Food tables should soon be used for the substitution of other foods. He divides the insulin doses as in adults, and begins with 3 units at a dose, to be increased by 3 units at a time until acidosis is controlled and the sugar in the 7 to 9 P.M. urine reduced to a trace. To avoid insulin shock as well as acidosis, a moderate glycosuria may be allowed to persist in the juvenile cases.—Tr.]

DISEASES OF THE NERVOUS SYSTEM.

The treatment of nervous disturbances has already been alluded to many times in the course of the present work, in connection either with the symptoms (*Hemiplegia, Neuralgia, Nervousness, Tremor, Vertigo*) or with diseases of the other systems of organs, which often bear very close relationships to the nervous system (see, in particular, *Diseases of the Circulatory System: Cardiovascular Syndromes and Psychotherapy*).

In view of the limited space available, as well as in conformity with the general plan of the work, the discussion in the present section will be limited to a short condensation of the essential facts of neurotherapy having a truly practical bearing.

I. *Treatment of the neuroses and psychoneuroses: Neurasthenia, hypersthenia, the anxiety neurosis and hysteria.*

II. *Treatment of Graves's disease.*

III. *Treatment of the epileptiform states.*

IV. *Treatment of meningitis.*

V. *Treatment of nervous syphilis and, in particular, of tabes dorsalis and general paralysis.*

THE PSYCHONEUROSES.

Does the following classification of Hartenberg's meet with the approval of the psycho-neuro-pathologists? I do not know; but I would be surprised if it were not approved of by the non-specializing practitioners. It presents, at least for the latter workers, the twofold and marked advantage of being a relatively simple clinical classification and of affording rather precise therapeutic indications.

There are four main groups of psychoneuroses:

1. **True neurasthenia**, in which the patient is depressed and exhibits an *irritable weakness of the nervous system*, and in whom lassitude, alike physical and mental, is predominant. This extreme propensity to fatigue distinguishes neurasthenia rather easily from the other psychoneurotic modalities, but the condition will always have to be carefully differentiated from:

(a) Mild *melancholia*, manifested in recurring attacks, with predominance of the affective phenomena. (b) True *hypochondria*, a practically delusional mental disturbance associated with bizarre and even absurd

interpretations and cenestopathic sensations (as of an animal parasite in the digestive canal, a worm gnawing at the heart, putrefaction of the intestine, etc.).

2. **Hypersthenia**, in which the subject is excited, restless, and the exact symptomatic counterpart of the neurasthenic: An indefatigable restless individual who is terribly fatiguing to his associates.

3. **Anxiety neurosis**, a congenital condition in which the subject exhibits from early childhood manifestations of anxiety with phobias, obsessions and impulses.

4. **Subjects afflicted with auto-suggestive disturbances** which are identical, it seems, with **hysteria**.

The difficulty attending the study of these psychopathic conditions lies, moreover, in the fact that they are generally associated, interwoven, alternate or coexistent. But the four types above mentioned correspond to actual clinical conditions. I accept them as such. The essence of the clinical consideration of such conditions lies in analyzing them, dissociating them and combining them according to the kind of case under observation.

NEURASTHENIA.—The treatment of neurasthenia, as it is applied by Hartenberg, whom I follow herein with certain few modifications, recognizes four main indications:

1. **Rest.**—The neurasthenic is, above all, a fatigued individual. The natural remedy for fatigue is rest. The rest should, however, be correctly measured out and mitigated by periods of physical and mental training.

If the lassitude is very marked and of very long standing, it may be necessary to counsel at the beginning of treatment a few days of complete rest in bed. This is, however, an exceptional occurrence. In most instances relative rest is sufficient.

Let the patient merely prolong his daily period of rest in bed, remaining ten, eleven or twelve hours a day in bed. After meals, especially the lunch, let him lie down for an hour. This procedure of breaking into the day with a period of relaxation is favorable to the restoration of nervous energy.

Nor is it necessary for the patient to give up his work or profession. He must, however, avoid all unnecessary effort, remain standing as little as possible when conditions permit of his sitting down, avoid walking when he can use a conveyance, and rest a moment when he feels tired. In short, he should constantly and everywhere practise "economy of effort." He should avoid fatiguing distractions and the prolonged journeys so often wrongly recommended for these cases.

I wholly endorse this principle of "economy of effort." Our rôle, however, should not be limited to an almost passive ratification of the existing nervous deficiency, but we should, on the contrary, endeavor by a gradual course of training, to strengthen the dynamic nerve power of the patient, and this is precisely the purpose of the measures next discussed.

2. Detoxication.—Since toxic influences exert a distinctly unfavorable action on neurasthenia, it is important to combat them.

Diet.—The ingestion of all substances prejudicial to the nervous system should be avoided: Alcohol, tea, coffee, sea fish, game, over-spiced foods, etc.

Most neurasthenics suffer from atonic dyspepsia with dilatation. Hence the need of interdicting indigestible foods, apt to cause flatulence, and of allowing the most substantial diet possible in the least possible volume.

Others suffer from chronic enteritis, hepatic insufficiency or renal insufficiency; others still are gouty, diabetic, etc. Therefore, correspondingly different dietary régimes will be required.

Watering places.—The patient may go each year to a thermal resort to carry out an annual detoxication of the system.

Physical agents.—Physical therapy, sweats, vapor baths, massage, and systematic gymnastic exercises are of great service, not only for the elimination of toxic material, but also as a course of training of the organism for the purpose of improving resistance to fatigue.

Lastly, the antiseptics of the digestive tract and the diuretic and diaphoretic drugs complete the detoxication treatment.

3. Tonic Treatment.—The drugs will be taken up first.

Strychnine is unquestionably the best of the tonic drugs. But to obtain from it all the benefit it is capable of affording, it must be prescribed in certain definite ways.

In the first place, it must be given in large doses; in fact, in the maximal dose borne by the patient. This maximal dose is much higher than the doses of 0.002 or 0.003 gram ($\frac{1}{30}$ to $\frac{1}{20}$ grain) a day commonly specified. The maximum of tolerance is marked by the manifestations of the "physiologic limit," consisting in the appearance of the earlier symptoms of strychnine intoxication—slight inebriation and stiffness of the legs. This condition hardly shows itself below 0.006 to 0.009 gram ($\frac{1}{10}$ to $\frac{1}{7}$ grain) given by injections in a subject not previously taking the drug, and with allowance for his weight. Further, since rapid habituation to the drug occurs, it is necessary progressively to increase the doses.

Hence the following procedure, described by Hartenberg:

A 1 per cent. solution of strychnine sulphate is prepared. The amount injected on the first day is 0.004 gram ($\frac{1}{15}$ grain). The dosage is increased by 0.001 gram a day until physiologic symptoms appear.

These symptoms begin at about 0.006 to 0.008 gram ($\frac{1}{10}$ to $\frac{1}{8}$ grain). At this juncture, if the dose thus reached is kept up for two days, the symptoms disappear. The amount is then increased by 0.001 gram, which reawakens the reaction, and so on. One may thus sometimes succeed in injecting 0.01 or 0.015 gram ($\frac{1}{6}$ or $\frac{1}{4}$ grain) without causing symptoms.

Furthermore, since elimination of the drug occurs in about four hours, it is possible to give on the same day two or even three injections of like amounts.

Thus conducted, strychnine medication yields excellent results as regards the asthenia. After a few days, the nervous condition of the patient improves and all the symptoms of depression become less.

This treatment with strychnine may and should be combined with the use of other tonic remedies. There is every advantage in associating with it the iron preparations, and arsenic in the form of sodium cacodylate, arrhenal, or Fowler's solution; in those in whom glandular insufficiency is suspected, thyroid, suprarenal, pituitary, ovarian or testicular preparations; in others still, injections of physiologic salt solution, Chéron's solution (a 1 per cent. solution of sodium chloride, sodium phosphate and sodium sulphate), sodium nucleinate, or the glycerophosphates. I personally add to this list phosphoric acid, frequently of value.

The physical agencies also afford useful assistance: Hydrotherapeutic procedures (carefully adapted to the patient), static electricity, general faradization, massage—all these measures, used when indicated and in proper amount, will also contribute in counteracting the depression of the neurasthenic subject.

4. **Psychotherapy.**—Psychotherapy is doubtless insufficient to overcome the diminution of nervous influx, yet it is well, "by suitable talks, to allay the patient's fears, combat his auto-suggestions, stimulate his energies, rekindle his hopes, keep up his patience and cultivate a spirit of resignation on his part as regards the distressful emotions that may be the source of his illness."

The results vary according to whether the predisposition to the disturbance is pronounced or slight. In the former event, only improvement will be obtained. In the latter, the prognosis will depend solely on the exciting causes. If these are serious, or irremediable,

cure of the neurasthenia is not feasible. If they are curable or transitory, the neurasthenia will be recovered from after a varying period of time.

In an attempt to consider the treatment of neurasthenia in sufficient detail, volumes could be filled without exhausting the subject. But actual clinical cases respond well to the many possible variations on the foregoing four essential themes, *vis.*:

1. Mitigated rest.
2. Detoxication.
3. Tonic medication, based on strychnine.
4. Psychotherapy.

THE ANXIETY NEUROSIS.

1. Causal Treatment of the Syndromes of Anxious Emotivity.—As in all other neuroses, the causal treatment calls for an inquiry, through a thorough, complete examination of the patient, for any organic deficiencies he may possess and the treatment by appropriate measures of tuberculosis, alcoholism, drug habits, malaria, syphilis, dyspepsia and nutritive dystrophies, etc.—not that these conditions may suffice in themselves to induce a true anxiety neurosis, since there is unquestionably required a constitutional predisposition or hyperemotivity, but that, obviously, all these disturbances must be cared for in any case, and supply fuel, an opportunity or an exciting impulse to this neurosis in those predisposed to it.

2. Prophylactic Treatment of Constitutional Hyperemotivity.—At this point I would be glad if I could reproduce the admirable pages F. Heckel has devoted to this subject in his book. An idea of their substance will be had from the following few excerpts: "All badly brought-up children, and by this expression I refer, not to those who are deficient in the ordinary proprieties, good breeding and politeness, but merely those in whom will-power has not been developed, are candidates to the asthenic and emotional neuroses. Parents who spoil their children make them not only hateful to other persons, but also, and particularly, to themselves. It is among the spoiled children, those who are accustomed to doing as they please, that are later recruited the hysteric, the neurasthenic, the emotional, the anxious, the unstable and often, unfortunately, the abnormal and the good-for-nothing individuals, as well as those who go astray.

"The child who is not taught while still young that pleasure is not a right of his, but a reward, that work is a law of life and that fruitful activity is the true source of inner satisfaction and of health, enters into existence with the germ of depression, of neurosis and of

uselessness. He who is not taught to obey in order to know how to command at a later time; to submit to individual discipline and to social authorities; to be a severe censor of each of his own acts; to moderate the expressions of his pain or joy, and to obey oftener the suggestions offered by mental reasoning than the impulses arising from his senses, is launched into the sea of life like a ship without a rudder and is tossed about by all gales. Childhood without training of the will becomes a prey to all parasitic suggestions and remains thenceforth incapable of following a normal, and especially a happy, individual and social career."

In short, **the prophylaxis of constitutional hyperemotivity consists in education**, and particularly in education of the will. The part played by the family associates is exceedingly great, and it is in this field that the physician can and should exert all his influence to protect the predisposed individual from emotional contagion. He should, furthermore, coöperate with the family and the child's instructors to bring into play, through a process of hygiene, at first of a general order, then, in the broadest sense of the word, physical, dietetic, intellectual and moral, that training of the will-power and of the executive faculties which will insure for the individual complete mastery over himself and productive yield, in that harmonious combination of health, will-power and morality so concisely expressed in the ancient phrase: *Mens sana in corpore sano*.

In the Adult.—In the adult the rôle of the psychotherapeutist is, if possible, a still more delicate one.

"By virtue of the law, upon which the modern dynamic thought is based, that every brain cell brought into activity by a thought activates, in turn, the nerve fibers called upon to bring this thought into execution; by virtue of the fact that the thought may become transformed into a general sensation or a visual image, that it may become a visceral sensation, a movement or a secretion, the *contrary thought*, originated through auto-suggestion or introduced by suggestion from the outside, may counteract a movement, a visceral sensation, a general sensation, a visual image or a secretion.

"The essential prerequisite for the penetration of a suggested thought, however, is the state of receptivity of the brain that may be designated as *suggestibility*. The latter is itself related to emotivity, of which it is merely a specialized form. Accordingly, by definition, emotive subjects are subject to suggestion not only by their own ideas (auto-suggestion) but also by those which other persons may introduce into their brains (hetero-suggestion). Many of them are all the more subject to hetero-suggestion because their anxiety causes them to

hope that they will find in the idea suggested by some one else some curative or comforting measure—some form of recourse against their own state of distress.

"It is through the different procedures known as external *suggestion*, *persuasion* by speech and gesture, mental and moral *reeducation of the will*, and likewise by instigation toward favorable *auto-suggestion*, that psychotherapy may be brought into action.

"It is particularly in the cases suffering from morbid emotivity and anxiety that the physician should act as a confessor to whom the patient can turn and sometimes derive much comfort from relating his miseries, which seem less to him if they are heard by some one and he is consoled from them after he has imparted them in a moment of distress. A physician who wished to withdraw from this psychic rôle would be certain greatly to diminish the curative value of his therapeutic endeavor as a whole. The treatment should be completed by outlining for the patient a line of psychic and moral conduct which should aim at the reeducation of his frequently waning will-power" (Heckel).

3. Emergency Treatment of the Paroxysmal Manifestations.—(a)

In the presence of a paroxysmal attack of anxiety neurosis, whether manifested in asthma, syncope or angina, spasm or nausea, etc., the most important point is to allay the pain and appease the anxious craze of the patient and his associates and to arouse in the patient confidence in his own body and in the treatment. Calmness is contagious, like excitement, and confidence, like fear. The physician should be sparing of gestures and of words; the latter should be firm, brief and positive. Personal authority is sovereign under these conditions. It is dependent upon confidence.

Certainty of diagnosis, power of affirmation and reassuring suggestion are the essential factors in the treatment. The opposite deficiencies, *viz.*, mistakes in diagnosis, weak-kneed hesitation and disquieting prognosis, lead to disastrous results. How many neuropaths suffering from pseudo-angina, pseudo-asthma and pseudo-gastric disease remain bowed down with the fear of angina pectoris, appendicitis or gastric ulcer, or the possibility of sudden death, through being inadvisedly diagnosed and given prognostic forecasts by an attendant himself anguished, anxious and pusillanimous.

(b) **Drugs** are available as much for suggestive as for pharmacodynamic action. Ether, valerian, ether and opium preparations, the diffusible stimulants (ammonium acetate, etc.), the antispasmodics (hyoscyamus, belladonna, amyl valerate) and the hypnotics (barbital, carbromal, dial, etc.) usually form the basis of drug treatment. In-

jections of opium or morphine should be prescribed and employed only as a last resort, in the presence of a really lasting, severe and rebellious attack. In the asthmatoïd or anginoïd cases I am in the habit of prescribing, with appropriate suggestion, the following preparation:

R. Ammonii acetatis	4 grams (3j) ;
Spiritus vini vitis	20 c.c. (f3v) ;
Syrupi ætheris (2 per cent.)	30 c.c. (f3j).—M.

A few swallows of this are ordered taken in the event of malaise or faintness; in 19 out of 20 cases the bottle remains untouched. The patient has no more attacks provided he has the medicine within reach, in his pocket or near his bed.

(c) **External applications**, consisting of plasters, poultices, compresses, mustard packs, rubs, sprays, massage, percussion, etc., may, in truth, act reflexly as sedatives or tonics or excitants of the general nervous system; but their action is mainly connected with the coexisting suggestive influence. *The manner of giving is worth more than that which is given.*

In short, as a chiefly psychic disorder, the anxiety neurosis calls especially for psychotherapy, alike in its paroxysmal manifestations and in its ordinary anxious form.

HYSTERIA.—Hysteria—its origin, nature, significance and treatment—constitutes one of the most knotty, absorbing and . . . seductive problems of clinical medicine. It lends itself to the most brilliant as well as suggestive investigations. As a matter of fact, however, the results of such studies are, in practice, of little actual service.

Consideration of the subject will here be limited to the recalling, according to Babinski's description, of its essential clinical feature, *viz.*, "pithiatism," which brings in, indeed, the whole of the treatment of hysteria, since it corresponds, in the last analysis, to the expression "disturbances curable by persuasion."

Thus, *psychotherapy* constitutes the essential treatment of hysteric manifestations, and Babinski summarizes the guiding principles of this treatment as follows: "Considering the fact that pithiatic phenomena can more or less accurately simulate the disturbances of function existing in a great variety of diseases; that they may be associated not only with the nervous affections, but with all visceral, thoracic and abdominal affections, and that they are capable of undergoing rapid and even instantaneous recovery or of persisting indefinitely according as their nature is or is not recognized and the at-

tendant acts or fails to act as a good psychotherapist, one is led to maintain that it is not permissible for any clinician to disregard their study. This appears to me all the more true in that a physician in contact with his suggestible subject will inevitably exert upon him by his spoken words or silence, by his zeal or by his carelessness, an influence which, if it is not good, will be bad; that the presence of this physician will be either harmful or useful, and that it can hardly remain indifferent.

"Aware of the influence he exerts on suggestible subjects and the rôle he is involuntarily exposed to playing, if he does not take care, in the induction of pithiatic phenomena, the physician, while observing his patients, should likewise observe himself; he should exercise careful watch over what he says, remembering always that an ill-planned question or an inopportune remark may be the source of a suggestion. There is an element of danger therein which he should not lose sight of.

"Knowing that a suggestible subject is very readily influenced by his associates, he should not rest content with acting in person, by psychotherapeutic means, on the patients with pithiatic disturbances; he should, in addition, endeavor to create, by all possible means, a psychic environment that will be wholesome for them.

"Convinced that the true pithiatic disturbances will yield rapidly to skilfully applied psychotherapy, the physician who, in a case of this type, has seen his therapeutic endeavors fail should be led to the thought that success may have been blocked by some contra-psychotherapeutic influence; this he should try to discover, in order to bring about its disappearance and thus procure the conditions that will insure recovery.

"Knowing the limits of pithiatism, he will be able to distinguish disorders that are not comprised in this field, and will not undertake to cure them by psychotherapy. Abstaining from making promises which he is not able to fulfil, he will thus avoid discrediting himself. In addition—and this is more important,—harboring no illusions as to the effects to be expected from such treatment, he will be less apt to neglect the therapeutic measures which the non-pithiatic affections may call for."

* * *

The physician may thus bring into action all possible modalities and variations of the physical agencies, and their effect will be miraculous or *nil*, or even prejudicial, according to the amount of suggestion combined with them.

"None of these therapeutic measures possesses any specific curative value. Their action is almost exclusively dependent upon the efficacy of the persuasive influences with which they are accompanied" (H. Meige).

Cold or tepid **hydrotherapeutic procedures** are nearly always useful. The best cold procedure, which, indeed, has long been employed, is the cold jet douche over the whole body except the head, continued for at most thirty to sixty seconds and ending in a rather warm jet directed at the feet.

Electricity in its various forms, galvanic, faradic and static, appears to exert solely a psychic influence.

* * *

A most valuable, and sometimes indispensable, adjunct of psychotherapy in these cases is **isolation**.

"Isolation has for its purpose and result to remove the hysteric subject from the environmental influences among which his symptoms have originated and gradually developed. It is not always easy to detect these influences; while at times they are obvious, in other cases they can only be suspected, and inquiries of this nature always are such a delicate matter that it is well to undertake them only with extreme circumspection. In a general way, however, it may be positively stated that removal from the ordinary environment will always exert favorable effects. To be sure, more than one obstacle is met in having this plan accepted by the patients as well as their associates. The first few days of isolation sometimes prove a hardship; but adaptation quickly occurs and the benefits from the procedure are not slow in appearing. The patients themselves, upon recovery, are the first to recognize the favorable effects of this method" (H. Meige).

Either the *isolation should be complete*, in an institution in which supervision, general care and opportune psychotherapy can be practised in a thorough, wholesome manner, or one must rest satisfied with *relative isolation*, carried out least disadvantageously by going from place to place, voyages and vacations; the latter plan is, however, only a makeshift. In this delicate matter, moreover, there intervene such factors as proper judgment, the nature of the case, psycho-analysis, good nature and good sense.

In general, *hypnotic procedures*, *suggestion* and artificial sleep are being increasingly given up and disapproved of by neurologists as being likely to increase the pithiatism of these patients.

GRAVES'S DISEASE.

That the decision was taken, after much hesitation, to group Graves's disease along with and following upon the neuroses and psychoneuroses, was because of the fact that, whatever opinion one may entertain as to the exact nature of this disorder, the manifestations of sympathetic neurosis are those which clinically predominate, and that it has seemed in conformity with the rules of practical didactic consideration to group together the commonest forms of the sympathetic neuroses, which actually are so often present together.

In this connection the reader is referred to the synthetic table of the neuro-cardiovascular syndromes (under *Diseases of the Circulatory System*), among which Graves's disease in many of its aspects likewise belongs.

The question whether exophthalmic goiter is of thyroid or sympathetic origin has been the subject of much controversy. Cases apparently equally conclusive have been adduced in support of each of these views. It appears, indeed, that the starting-point of Graves's disease may be either definitely thyroid (acute thyroiditis, toxic goiter) or definitely neuropathic (post-emotional or post-traumatic Graves's disease; the same persisting or recurring after thyroidectomy, etc.).

It is nonetheless true that, once established, exophthalmic goiter combines two factors, *viz.*, **dysthyroidia** and **sympathetic neurosis**.

Dysthyroidia, and more particularly hyperthyroidia, brings about in predisposed (sympatheticotonic) individuals the syndrome of Graves's disease in a more or less complete form (thyroid enlargement, exophthalmos, tremor, pulse acceleration, hyperemia, etc.) by stimulation of the sympathetic centers (sympathetic neurosis).

The **sympathetic neurosis** (sympatheticotonia), by virtue of the hyperemic conditions, especially of the thyroid and adrenals, to which it gives rise, tends to aggravate the disturbance. There is thus brought about a physiopathologic vicious circle.

The therapeutic problem presented consists in breaking into this vicious circle of **dysthyroidia-sympatheticotonia**. *Indeed, all the treatments that have given results have been directed at one or the other of these factors. They have aimed either to correct the secretory functioning of the thyroid or to allay the sympathetic hypersthenia. In most instances it is appropriate to combine these two objects.*

In the treatment of Graves's disease there are applied, with varying results, very many different agents: A probable indication that beneath the apparent unity of the clinical syndrome is concealed a profound etiologic disparity. (See the synthetic table presented herewith.)

TREATMENT OF GRAVES'S DISEASE.

TREATMENT DIRECTED AGAINST THE SYMPATHETIC NEUROSIS.

Sedative General Hygiene.

Avoid stimulants (tea, coffee tobacco, alcohol).
 Avoid overstrain.
 " emotions.
 " passions.

Physical Agents.

Sedative hydrotherapy.
 Tepid douches, 25 to 30 seconds.
 Warm baths, 25 to 30 minutes.
 Cervico-epigastric galvanization.
 Mineral water cure.

Pharmaceutic Agents.

1. Bromides, valerian, antipyrin.
2. Quinine, 0.5 to 2.5 grams.
3. Sodium salicylate, 2 to 4 grams.
4. Mercury and arsenic if syphilitic.

Psychic Agencies.

Isolation, psychotherapy.

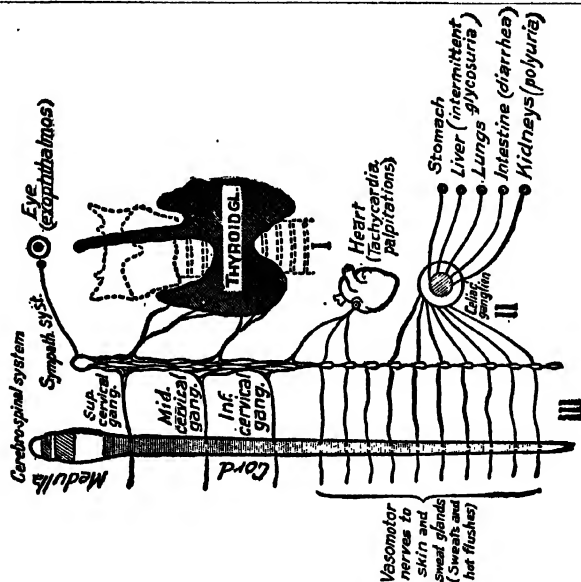
Surgical Intervention.

Section of sympathetic (Jaboulay, Faure, Jonnesco) (bilateral section of the cervical sympathetic).

GRAVES'S (BASEDOW'S) DISEASE EXOPHTHALMIC GOITER.

NEUROPATHIC FACTOR THYROID FACTORS.

SYMPATHETIC NEUROSIS. DYSTHYROIDIA.



TREATMENT DIRECTED AGAINST THE DYSTHYROIDIA.

Physical Agents.

Brine applied over the thyroid.
Galvanic treatment: + over the back—over the thyroid, 50 to 80 milliamperes for 20 to 30 minutes. Sodium salicylate solution, 5 per cent.
X-rays: Most effective method, but the hardest to apply.
Radium.

Organotherapeutic Agents.

1. *Thyroid medication* (paradoxical); at least, begin with small doses only—not over 0.1 gram a day:
 (a) Exophth. goiter tending toward myxedema.
 (b) Simple goiter becoming toxic.
 (c) Post-infectious exophthalmic goiter.
Antithyroid medication.
 Serum of thyroidectomized animals.
3. *Various organic preparations:*
 (a) Fresh thymus, 50 to 75 grams a day.
 (b) Hypophysis (whole gland), 0.1 gram twice daily.
 (c) Ovarian extract.

Surgical Intervention.

1. Ligation of thyroid arteries.
2. Partial (one lobe) or total thyroidectomy.

At all events, there is called for in every case a *sedative and detoxicant* plan of treatment, consisting of relative rest with myotherapy according to indications, a diet poor in proteins, and alkaline and laxative medication. There is likewise required a *search for and correction of all morbid processes, wherever situated* (tonsils, nose, sinuses, nasopharynx, teeth, digestive tract, genital organs, etc.), such processes being the starting-point of toxic infections, always of harmful portent. Syphilis, sometimes the cause, should be inquired into.

Electrotherapy, which had given place to X-ray treatment, seems to be resuming its well-deserved position as a complementary measure, and one sometimes superior to the X-ray alone. Galvanization of the abdomen and thyroid has, in particular, been recommended recently by Ménard and Foubert. The treatment, comprising three sittings weekly, must be continued at least three months.

EPILEPTIFORM STATES.

The domain of epilepsy is one of those which should recall most forcibly to the clinician the profound reasons existing for an admixture of humility with his pride in the achievements of the medical profession. Hartenberg expresses himself thus on this subject:

"And if now, in conclusion, I were asked for my general impression of this problem of epilepsy, I would say:

"We know nothing, or almost nothing. The whole question still requires to be worked out. And even the little that we think we know is incorrect. What is stated in current text-books applies only to a small number of patients; the others do not correspond to the description. The conception too often held of epilepsy, *viz.*, that it is an inherited, inevitable defect associated with irremediable lesions of the brain, is wrong. No doubt, there are institutional subjects who are degenerates and have cerebral malformations, who afford the most sinister specimens of the disease. But these subjects are less epileptics than they are idiots with epilepsy. Their disease consists not in having intermittent attacks, but in a chronic, incurable state of brain insufficiency.

"In many others, on the other hand, who are well constituted, as normal as regards intelligence as the average human being, the epileptic attacks appear to me as an accidental disturbance, as a reaction of the nervous system to casual influences, which could and should be recovered from if we knew how to treat them properly. The attacks may come on in any person, at any age, without there having previously been any reason for expecting their appearance,

and without leaving any traces if the patient is fortunate enough to get rid of them. Any one of us might have an epileptic attack just as he might have a fit of depression, anxiety or tachycardia, or an attack of tuberculosis. And such a condition would not preclude his being a talented person or even a genius—witness Flaubert and Napoleon.”

Moreover, the general tendency among neurologists seems toward the recognition that there occur only **symptomatic epilepsies** or **epileptic syndromes** consisting of morbid responses of the cortical neurons predisposed to them through heredity or otherwise. These responses take place in the form of abrupt, involuntary contractions, of short duration and occurring in seizures or in series of seizures separated by intervals of rest. As noted by Hartenberg, our knowledge of the true pathophysiologic nature of the epileptic attack is still very limited, and along with the phenomena of cortical stimulation it has been found necessary to bring in inhibitory phenomena.

So obscure a pathologic problem cannot imply a very clear-cut solution of the therapeutic requirements.

Solely on the basis of the clinically established facts, the problem may be said, for the benefit of the non-specializing practitioner, to present itself, in a general way, as follows:

Epileptic seizures are met with generally in *subjects predisposed* (epileptic constitution) through morbid *heredity*; they are brought on by *psychic stimuli* (emotions, difficult situations) or physical stimuli, and their *manifestations* consist in temporary loss of consciousness, convulsive attacks and amnesia.

The factors calling for treatment are the **inherited deficiencies**, the **epileptic constitution**, the **epileptogenic stimuli** and the **epileptic manifestations** themselves, as outlined hereinafter:

EPILEPSY.

I.—Inherited Deficiencies.

1. Alcoholism (and other drug habits).

2. Hysteria.

Epilepsy.

3. Nervous overexcitability (hyperemotionalism).

Perversion or loss of the maternal instinct.

Mental debility.

Insanity.

Prophylactic Treatment.

Combat these deficiencies in the parents.

Forbid or at least advise against marriage in the more seriously deficient.

II.—Epileptic Constitution.

Unconscious mentality.
Perversion of the instincts.
Hyperemotionalism.
Spasmophilia.

The general make-up of the epileptic should be strengthened in all respects: Physical, intellectual and moral. The treatment is summarized in one word: *Education* (training).

Physical training, to increase resistance to external stimuli.

Humoral training: Protein therapy.

Mental training: Well-balanced instruction, chiefly of a concrete order.

Moral training, to improve self-control, cool-headedness, patience and perseverance.

III.—Stimuli.

Psychic stimuli; emotions;
difficult situations.
Physical stimuli.

Psychotherapy, here essential, in intelligent subjects, consists of:

1. Combatting the hyperemotionalism of the patients by appropriate training.

2. Determining through careful psycho-analysis the difficulty which the subject is seeking to "evade" through his attacks, and combatting it if possible.

The general examination should include a search for all possible defects, errors, vices and sources of irritation, which should then be combatted. Disinfection of the digestive tract should not be neglected. Guelpa treatments are always wholesome.

IV.—Actual Manifestations.

1. Loss of consciousness.
2. Convulsive seizures.
3. Amnesia.

Against the seizures themselves we are rather helpless; the physician's rôle is limited to placing the patient under the best possible conditions to avoid accidents.

Bromide medication and *hydrotherapy* remain, along with a few adjunct measures, the standard treatment. [Luminal also valuable.]

* * *

In short, the conception of an *epileptic syndrome*, of the *symptomatic epilepsies*, leads to the following very simple and very general rule:

1. **Seek the various factors which are proximate or remote causes**, direct or indirect, mechanical or vascular, chemical or physical: Traumatism, exostoses, sequestra, peripheral or visceral irritation (reflex or traumatic epilepsy), infections, intoxications, auto-intoxications (infectious, toxic or auto-toxic epilepsy). Combat these factors. Thus, from the etiologic standpoint, any form of therapeutic measure may be required, from restriction to fluids with detoxicant purgation to specific treatment or a decompression operation.

2. **Meet the therapeutic indications afforded by the symptomatic manifestations** of the disease (convulsive attacks, amnesia, incontinence of urine, etc.) and of the patient (age, sex, endocrin insufficiencies, anemia, plethora, etc.).

Accordingly, one may be called upon to bleed a plethoric subject, purge a patient with gastro-intestinal infection, administer sodium cacodylate to an anemic patient, strychnine to a depressed patient with low blood-pressure, etc.

3. As for the seizures themselves, they are influenced, as is well known, chiefly by the **bromides**. Taking into the account the facts that bromide medication is rendered more active by a salt-free diet and that thyroid medication is often a useful adjunct, the following plan of treatment, described by Sicard, may be used in a case of epilepsy of intermediate severity:

(a) Every morning, for three weeks, dried thyroid gland, 0.1 gram (1½ grains) (equivalent to about 0.6 gram—10 grains—of the fresh gland). This treatment to be resumed after an interval of one or two weeks.

(b) Each day, 2 grams (30 grains) of potassium bromide, preferably between meals and dissolved in at least a half-glassful of water. The two amounts of 1 gram each should be taken at approximately regular intervals (*e.g.*, at 10 A.M. and 10 P.M.).

(c) Salt-free diet.

(d) In the event of facial acne, a very hot 50 per cent. solution of sodium chloride should be applied with cotton over the pustules, and an ointment of sulphur rubbed on, allowed to remain over night, removed the next morning and replaced by a bland powder.

This treatment may be interrupted at intervals varying according to experience in the individual case.

4. **Phenobarbital** (*luminal*) has been recommended in late years for cases in which the ordinary bromide treatment has proven a failure.

This drug, chemically phenyl-ethyl-malonylurea, is at the present time the most effective symptomatic remedy, in daily amounts of 0.1, 0.2 or even 0.3 gram ($1\frac{1}{2}$, 3, to 5 grains). It must, however, be administered with care, having certain definite drawbacks.

The *untoward results* from phenobarbital may be slight or serious.

(a) Slight disturbances: Torpid state, reduced power of concentration and impaired memory, lassitude, and occasionally vertigo, staggering or nausea. These effects are noticed mainly at the start of treatment and are apt to decrease as the patient becomes accustomed to the drug.

(b) Severe disturbances: Pruriginous or urticarial skin eruption with fever, sometimes puffing of the face and neck, enlargement of the cervical lymph-nodes, nausea and vomiting. These may make their appearance without having been preceded by the lesser symptoms.

On the other hand, sudden stopping of the drug may in some instances induce mental excitement with delirium or repeated attacks or sometimes even a continuous state of excitation.

Thus, patients under phenobarbital medication need close watching.

The drug does not always give the desired results and in some cases even is poorly tolerated. It may be combined with potassium bromide or sedobrol. In any event, there is often advantage, in order to avoid large doses, to combine with it a small dose of bromide, or borico-potassic tartrate.

Following is an excellent formula by Ducoste; the belladonna reinforces the action of the phenobarbital, while the caffeine mitigates the mental dullness and somnolence:

R Phenobarbitali	0.1	gram (gr. iss);
Belladonnæ pulvis	0.02	gram (gr. $\frac{1}{50}$);
Caffeinæ	0.025	gram (gr. $\frac{1}{12}$).

5. *Borico-potassic tartrate* exerts an anti-epileptic action at least equivalent to that of bromide medication.

It is used in doses of 3 grams (45 grains) a day, on an average, dissolved in water, with or without addition of a little glycerin. Thus, 20 grams (5 drams) of borico-potassic tartrate may be prescribed with 10 grams (2 fluidrams) of C. P. glycerin and enough distilled water to make 300 cubic centimeters (10 fluidounces). One tablespoonful contains 1 gram (15 grains) of the drug. Three tablespoonfuls are taken daily, each in a glassful of water.

The principal advantage is the absence of mental depressive action, of acneic eruptions, and of gastrointestinal disturbances. A possible drawback is, sometimes, the production of relaxation of the bladder.

6. *Arsenic*.—Favorable results from arsenical treatment have very often been obtained not only in Jacksonian epilepsy, but also in generalized epilepsy of the idiopathic type, not only in cases in which organic signs point to a probable source in syphilis, congenital or acquired, but in many cases with a negative Wassermann reaction of the blood and cerebrospinal fluid and no signs or history of syphilis.

This treatment has to be vigorous and prolonged. Hectin may be used in a course of ten to twenty injections of 0.2 gram (3 grains) at first every two days, then daily. From two to three weeks' rest should be allowed between series. If need be, ten or twelve courses should be administered. Some patients have recovered only after ten to fifteen months of treatment. Instead, neoarsphenamin may be injected intravenously, and this is the treatment of choice. Courses with rapidly increasing doses up to 0.9 gram are given, each course reaching, if possible, a total dose of 7 or 7.5 grams. Not rarely, two, three, or even four courses of injections are required. There is often an increase in the number of seizures at the start of the treatment.

As regards **traumatic epilepsy**, the following conclusions, formulated by Behague, are of value.

In the case of *acute epilepsy*, the cause, if it is superficially situated and localized, may be removed surgically; if it is diffuse and deeply situated, the causal treatment should be medical.

In the case of *long-standing epilepsy*, the treatment is symptomatic:

(a) If the epilepsy is due to a *non-penetrating wound of the skull*, the treatment by borax or by the urea derivatives is indicated. Surgical treatment is always harmful.

(b) If the epilepsy is due to a *penetrating wound of the skull*, medication by the urea derivatives or by the bromides should be employed. The surgical treatment, incapable of excising meningeal or cerebral

scars, is always contraindicated. If, however, there has been no opening through the dura, and the X-ray examination shows a foreign body, a fragment of bone broken off from the internal table or imperfect plastic repair, surgical removal of these causative lesions may be followed by cure of the disease.

(c) If the *seizures are preceded by prodromes*, a special plan of treatment may be instituted, consisting of an insufficient daily amount of some anti-epileptic remedy reinforced by large doses of bromide or of sodium borate as soon as the preliminary symptoms appear.

* * *

From a review of many recent investigations, contributed by Pagniez (*Presse méd.*, July 23, 1921), it would appear that, aside from the essential part played by the nervous factor in the seizures, an important rôle must also be ascribed to the humoral factor, and that at least certain forms of epilepsy are disorders involving the body-fluids in a manner analogous, no doubt, to migraine and gout.

As a matter of fact, many kinds of empiric or systematic treatments of varying efficacy appear to be merely special forms of *protein therapy*. Thus, a few recoveries have been reported following antirabic vaccination, tuberculin, diphtheria antitoxin, crotalin injections, intravenous injections of peptone, milk injections, etc.

MENINGITIS.

(Written with the collaboration of A. LUTIER, M.D.).

In this section we shall consider in succession the treatment of tuberculous meningitis; of the acute suppurative meningitides; of the acute non-suppurative meningitides, *i.e.*, the meningeal conditions complicating the various infections; of epidemic cerebrospinal meningitis, and of acute syphilitic meningitis.

TUBERCULOUS MENINGITIS.—There have been reported authentic cases of recovery from tuberculous meningitis in which the diagnosis had been made with the most accurate laboratory procedures; but the treatment in these cases certainly had no part in the recoveries. We are therefore still driven to symptomatic treatment, with the hope of a possible error in diagnosis, and the only chance of recovery remaining to the patient is that of a syphilitic origin of the meningeal manifestations. Accordingly, one should always remember to institute the specific treatment.

Potassium iodide (0.5 gram—7½ grains—per year of age) should be prescribed by the mouth or by enema, together with *mercurial inunctions*

in children or *intravenous injections of mercury cyanide* or other suitable salt in adults.

General Treatment.—1. Absolute rest in silence and darkness on account of the hyperesthesia.

2. Lukewarm baths (33° C.—91.4° F.) or warm baths (38° C.—100.4° F.)—the latter more sedative if there are contractures or convulsions, repeated every three or four hours.

3. Diet: Milk, soups, egg yolks.

When swallowing is interfered with, the food should be given in small amounts with a spoon or narrow-spouted pitcher, or, if necessary, enemas of milk containing the yolk of an egg administered.

Symptomatic Treatment.—1. Keep continuously over the head cold water compresses, frequently renewed, or better, an ice-bag separated from the scalp by a piece of flannel.

2. Purgatives: Calomel, either 0.2 to 0.4 gram (3 to 6 grains) in three or four divided amounts, or five to ten powders of 0.01 gram ($\frac{1}{6}$ grain) each, one every hour.

If the constipation proves obstinate, a purgative or glycerin enema should be given.

3. For the pain: Antipyrin, acetanilid, potassium bromide, which, however, generally fail.

In spite of the theoretic objections to opium (high toxicity in children, production of brain congestion), an injection of morphine is often the sole means of relieving the patient. One may begin with 0.005 gram ($\frac{1}{12}$ grain) and increase up to 0.01 or 0.02 gram ($\frac{1}{6}$ to $\frac{1}{3}$ grain) in a child of six or seven years, either by hypodermic injection or by enema.

4. For vomiting: Iced, carbonated drinks, an effervescent mixture, or chloroform water.

5. For restlessness and delirium: Potassium bromide or chloral hydrate by the mouth or rectum.

6. In convulsions, lumbar puncture is alone capable of yielding some benefit.

7. For collapse and lowered temperature: Warm wrapping in cotton; hypodermic injections of ether, camphor in oil, or caffeine; oxygen inhalations.

8. In the last stage, to prevent drying of the corneas, the eyes should be covered with moist compresses.

Local Treatment.—**Lumbar Puncture.**—While a diagnostic measure of the first importance, this procedure may also be effective in treatment.

It should be carried out repeatedly, an average of 20 to 30 cubic centimeters of fluid being withdrawn each time. One may even remove a large amount and wait until the fluid under high pressure is so reduced that it escapes only drop by drop. In infants, the needle is withdrawn when the beats of the fontanel have returned.

By this procedure, one lessens the pressure of the cerebrospinal fluid, which is endangering, through compression, the nutrition of the brain substance.

Lumbar puncture is therefore indicated especially where there is marked hydrocephalus.

Furthermore, it leads to disappearance of the headache and convulsions, lessening of rigidity of the neck and mental clouding, etc.; it may bring the patient out of a coma, at least temporarily. Rather frequently the pulse and respiration become regular after lumbar puncture.

This procedure, while generally harmless, is asserted not to be always free of risk; cases of convulsions, of hemiplegia and of sudden death with hypothermia following lumbar puncture have been reported.

Surgical Treatment.—The discrete form of meningitis in adults appears to be that most favorable for operation. The definiteness of the localizing manifestations has led to trephining operations, which, however, have not been followed by success.

Again, it has been thought that, as in tuberculous peritonitis, contact of the air might produce analogous favorable effects on the meninges. Further, it has been suggested that complete withdrawal of the cerebrospinal fluid, bacillus-laden and containing toxic material, would place the nerve centers at rest by reducing pressure and intoxication, but no success has followed trephining or trephining and puncture for drainage of the lateral ventricles, drainage of the cerebral or spinal subarachnoid space, nor injections of sterile air.

Fruitless efforts have also been made to inject into the spinal canal medicinal fluids such as iodoform in oil, colloidal metals, bacteriolytic serums, etc.

* * *

ACUTE SUPPURATIVE MENINGITIS.—**Treatment of the Initial Infection.**—Continued treatment should, of course, be applied for the primary infection of which the meningitis is merely a complication, *e.g.*, a pneumococcus infection, staphylococcus infection, typhoid infection, influenza, acute rheumatic infection (sodium salicylate), or malaria (hypodermic injections of quinine).

When the nature of an acute meningitis has not been clearly shown, one should always think of *syphilis* and institute specific treatment (potassium iodide in high dosage, mercurial inunctions in children, intravenous mercurial injections in adults). Gratifying surprises will sometimes follow.

General Treatment.—1. Absolute rest in bed, with the patient motionless and quiet. In the sick-room no noise whatever should be allowed, and light should be excluded, though the air should be freely renewed.

2. Painsstaking antiseptic measures in relation to the portals of infection.

Gargling and applications to the mouth and throat four times a day of solutions of resorcinol and sodium borate.

Introduction of resorcinol in petrolatum into the nostrils morning and evening.

Washing of the eyes and external auditory meati with warm boric acid solution.

3. Warm baths (38 to 40° C.—100.4 to 104° F.) every three or four hours for ten minutes, whenever the rectal temperature rises above 38° C. or the nervous manifestations are at all intense. These baths allay the pain and contractures and promote diuresis.

4. Diet: Milk, soups, egg yolks.

5. Injections of colloidal metals (electrargol: 10 to 30 cubic centimeters; gold collobiase, etc.) subcutaneously, intramuscularly, or better, intravenously.

Symptomatic Treatment.—1. Continuous application to the head of ice-water compresses, frequently renewed, or better, of an ice-bag separated from the scalp by a piece of flannel.

2. Endeavor to secure a derivative effect by the application of leeches behind the ears and of mustard poultices to the lower extremities.

3. Purgatives: Calomel, 0.2 to 0.4 gram (3 to 6 grains) in three or four doses, or five to ten powders of 0.01 gram ($\frac{1}{10}$ grain) each, one every hour.

If the constipation proves obstinate, a purgative enema, a glycerin enema, etc.

4. For the headache and pains: Antipyrin alone or in conjunction with quinine hydrobromide; antipyrin, 0.5 gram ($7\frac{1}{2}$ grains), and quinine hydrobromide, 0.25 gram ($3\frac{3}{4}$ grains), in a cachet; four to six cachets a day, at three-hour intervals, with a wineglassful of Vichy or Vals water.

5. For vomiting: Iced, carbonated drinks, effervescent mixtures or chloroform water.

6. For insomnia: Chloral hydrate or sulphonal.

7. For restlessness or convulsions: Potassium bromide, 1 to 4 grams (15 to 60 grains); chloral hydrate in the same doses, by the mouth or rectum.

8. Bear in mind the possibility of retention of urine, requiring catheterization.

9. Watch for the possible formation of bedsores.

Local Tréatment.—Lumbar Puncture.—Lumbar puncture relieves the headache, contractures and convulsions by reducing the hypertension of the cerebrospinal fluid.

One should withdraw as much as possible of the fluid, which consists practically of pus.

Even a continuous drainage of the spinal canal by allowing the needle used in the puncture to remain in has been advocated.

After each lumbar puncture an intraspinal injection of 10 to 20 cubic centimeters of electrargol may be given.

* * *

ACUTE NON-SUPPURATIVE MENINGITIS.—MENINGEAL STATES.—Treatment similar to the above, but less stringent, should be instituted. Lumbar puncture, repeated on occasion, will afford the patient relief. It is generally unnecessary to follow it up with an intraspinal injection.

* * *

EPIDEMIC CEREBROSPINAL MENINGITIS.—Prophylaxis.—During an epidemic, the disease is propagated by the *healthy carriers* of meningococci, who harbor the germ in the nasopharynx for an average period of ten days, but sometimes for weeks and months.

Bacteriologic examinations should be made, therefore, of the nasopharyngeal mucus of all suspects, relatives, neighbors, orderlies, etc., especially of those suffering from nasopharyngitis.

The healthy carriers should be placed in isolation until the meningococci have disappeared.

The most effective prophylactic treatment is that recommended by Vincent:

1. Inhalations four or five times a day for two or three minutes, carried out slowly and alternately through the two nostrils, of the following antiseptic solution:

R. Iodi	12	grams	(3ij) ;
Potassii iodidi	6	grams	(3iss) ;
Guaiacolis	6	c.c.	(f3iss) ;
Thymolis	0.25	gram	(gr. iv) ;
Alcoholis (60 per cent.)	200	c.c.	(f3vij).

M. Sig.: For external use.

Some of the mixture is poured into a small bowl which is floated on very hot water.

2. Application of the following preparation to the tonsils and nasopharynx twice daily:

R. Iodi,			
Potassii iodidi	āā	1 gram	(gr. xv) ;
Glycerini	24	c.c.	(f3vj).—M.

3. Frequent gargling with hydrogen peroxide solution diluted 1:10.

For children, the strength of the foregoing preparations should be reduced by one-third or one-half.

Disinfection of the sputum, linen, etc., and later, of the premises.

Closure of the barracks, schools, etc.

General and Symptomatic Treatments.—Same as in acute meningitis.

Local Treatment.—**Lumbar Puncture.**—This serves both for the withdrawal of as much as possible of the purulent, toxic fluid and for injection of the specific serum.

Specific Treatment.—**Antimeningococcus Serum.**—In the cases in which meningococcus septicemia is superimposed on the meningitis proper, subcutaneous or intravenous injections of antimeningococcus serum may be given. In no case can these, however, take the place of intraspinal injection of serum.

The serum should also be used as a local therapeutic agent, either by subconjunctival injection in meningococcal iridochoroiditis or by intra-articular injection in suppurative arthritis.

One should not wait for the report from the laboratory as to the cerebrospinal fluid before giving the intraspinal injection. In a case of acute meningitis of sudden onset, if the results of the anamnesis and physical examination do not permit of the recognition of a pre-existing tuberculosis or local infectious process (otitis, sinusitis, pneumonia, etc.), and if, in addition, lumbar puncture yields a cloudy fluid, antimeningococcus serum therapy should be resorted to without delay, particularly if an epidemic of cerebrospinal meningitis exists in the district.

If the cerebrospinal fluid is clear, one may, if need be, wait for the laboratory report, for either the condition is one of beginning cerebrospinal meningitis, and there is no harm in delaying the serum

injection for a few hours, or it is merely a meningeal reaction occurring in the course of some infectious disease, and the serum may present some disadvantages, among which is that of leading the physician astray. Indeed, after having injected the serum, the physician, performing another lumbar puncture the next day, will obtain a turbid fluid the result merely of the influx of leucocytes caused by the serum. The physician may then believe the disease to be of meningococcic origin and repeat the serum injections, thus possibly exposing the patient to anaphylaxis.

In an epidemic, however, an initial injection of serum should be given from the start even if the fluid is clear; no further injections are then given if the laboratory report is negative.

Injection of the Serum.—Thirty cubic centimeters is a minimal dose, even in very young children. In severe cases 40 to 60 cubic centimeters may be given, and even larger amounts in the very grave cases.

It sometimes happens that in twenty-four to forty-eight hours a single injection of serum will actually arrest the disease. The cerebrospinal fluid clears up; the meningococci disappear or are injured and stain poorly; the cultures become sterile; the polymorphonuclear leukocytosis is replaced by mononucleosis, and all the symptoms improve, except that the rigidity of the neck and Kernig's sign are more persistent.

In other patients, after temporary improvement, the evidences of meningitis reappear and the temperature rises again. **Therefore, the serum must regularly be injected for the first three days, and even for four days in the severe cases.**

As a rule, the meningeal symptoms (headache, fever, etc.) yield to this energetic treatment. The rigidity passes off more slowly.

If the symptoms fail to improve, there is great likelihood that they are not of meningococcic origin. In this event, Dopter's *anti-parameningococcus serum* may be injected in the same manner as has already been described.

What Serum Should be Used.—In order to be effective the serum must be well adapted to the causative microorganism. Three varieties of meningococci may intervene: A, B and C. The most frequent is meningococcus A.

Polyvalent serum proves much less effective than the monovalent serums, which it is best, if need be, to give in combination.

The first injection may be made with trivalent serum. When, by examination of the cerebrospinal fluid, culture of the organism and its agglutination by antimeningococcic serums, the kind of organism

responsible has been ascertained, the appropriate serum is alone used for the later injections.

If the cerebrospinal fluid is purulent and the bacteriologic examination cannot be made, the polyvalent serum must be continued.

Addition of General Serum Treatment.—It is a good plan to give during the first two or three days injections of 20 to 30 cubic centimeters of serum subcutaneously or intramuscularly; the intravenous route is reserved for grave cases.

By what symptoms shall the physician be guided in deciding whether the serum injections should be resumed?—The temperature curve is misleading as a guide, for some grave cases are devoid of fever. On the other hand, an injection of serum may cause the temperature to go up.

If he continues to repeat the serum injections, they may, in the first place, bring about temporary exacerbation of certain symptoms, *e.g.*, contractures, and lead to the belief that the meningitis is getting worse. They may even bring on grave anaphylactic symptoms. These appear more or less late, and often abruptly, in the adult, somewhere about the tenth day. They may, however, immediately follow the injection. Sometimes they are merely simple meningeal manifestations; at other times they consist of cyanosis, dyspnea, and tachycardia going on even to collapse, dilatation of the pupils and vomiting; not exceptionally they may terminate in death.

The serum treatment should, therefore, not be kept up without good reason. Improvement of the general condition, disappearance of the delirium and quietude of the patient are evidences pointing toward recovery from the disease.

It is mainly the study of the cerebrospinal fluid, however, which affords the most reliable guidance as to the continuation of treatment: Lumbar puncture carried out every four or five days for a week or two will supply proof that the cure is being maintained or will foreshadow a relapse. Lymphocytosis and, especially, disappearance of the meningococci allow of suspension of the treatment. The fluid may be stained a yellow-amber color by the unabsorbed serum. If, on the other hand, polynuclear leukocytes are still found predominating and meningococci present, another injection of serum should be given, disregarding the large amounts already injected (sometimes 600 cubic centimeters or more have had to be given).

To obviate anaphylactic reactions, *Besredka's antianaphylactic method* should be utilized: One to two cubic centimeters of the serum are injected subcutaneously at hourly intervals. At the fourth hour, an ordinary dose of serum can be injected into the spinal cavity. Ap-

pearance of a rash or increase of the symptoms calls for abstention from all further use of the serum.

*Aside from the anaphylactic manifestations there may develop simple serum reactions (urticaria, rheumatoid pains), which many observers, indeed, do not distinguish from anaphylaxis. For these manifestations calcium chloride and adrenalin may be given.

Failure of the Serum.—In some patients, after a series of periods of improvement under the influence of the serum injections, the action of the serum seems to have spent itself and the disease assumes a chronic form. Such failures appear to be due to meningeal lesions predominating over the convex surface of the brain or to subcortical lesions or ventricular localizations that are only imperfectly accessible to the serum.

In such cases, *brain puncture* followed by injection of serum has been combined with lumbar puncture. In infants, the puncture is made at the lateral angle of the fontanel; in larger children and adults, a *trephine opening* followed by *ventricular puncture* is made. Craniectomy has also been performed for purposes of cerebral decompression and to reach purulent collections.

Vaccine Treatment.—Antimeningococcus vaccines, being of low toxicity, should be used in large doses: One thousand millions as initial dose; then, taking into account the reactions, 4 and even 6 or 8 thousand millions are gradually reached. The injections are to be repeated every two or three days, subcutaneously or intravenously, in grave cases.

Heated or iodized vaccines should be used.

The vaccine should preferably be specific, either stock or autogenous. If identification of the microorganism has not been feasible, a polyvalent stock vaccine should be employed.

Vaccines should be used in the event of failure of the serum and in cases of meningococcic septicemia (temperature with daily oscillations; erythema, arthralgia).

Pyotherapy.—As a last resort or as an adjunct to the foregoing measures, pyotherapy may be resorted to.

It may be carried out by a fixation abscess, or by the injection of pus treated with turpentine (*e.g.*, 2 c.c.).

Protein Therapy.—Intravenous injection of peptone or small transfusions of citrated blood may be employed.

In particular, intramuscular injections (10 c.c.) should be resorted to; this is the least dangerous and most effective method.

NERVOUS SYPHILIS.

The nervous and circulatory systems are the sites of election of visceral syphilis. One might almost repeat here the discussion of this subject already presented under syphilis of the circulation. (See, in particular, the section on *Aortitis*).

From the practical standpoint of treatment, syphilis may involve the nervous system:

1. In the **secondary stage**, in the form of a **meningovascultitis**, occurring either early, in conjunction with the eruptions on the skin and mucous membranes, or late, at a period several years after onset of the disease.

It may be practically latent, and reveal itself only upon routine examination of the cerebrospinal fluid through a hyperalbuminosis, a lymphocytosis, and a positive Wassermann reaction. On the other hand, it may manifest itself in all forms, mild or severe, of the classic meningeal syndrome, acute or subacute. It may later end in the tabetic syndrome.

It is **generally recovered from**, either spontaneously or under anti-syphilitic treatment, to which it may show itself either more or less sensitive or more or less refractory.

It usually yields:

To the standard **mercurial treatment**, by the mouth, or rectum, or intramuscularly or intravenously.

It yields more readily:

To the modern combined **arsenical and mercurial treatment**, consisting of mercurial medication, as already described, in conjunction with the arsphenamins:

By the rectal route (neoarsphenamin or galyol by enema), in solution in physiologic saline solution.

Or better, by the intravenous route.

Exceptionally, and only in the rare instances of obstinate meningovascultitis refractory to the measures above referred to, a venture at intraspinal injection would be justified.

This question of intraspinal therapy has been very clearly summarized by Tzanck as follows:

Intraspinal Injections. Their Danger in Nervous Syphilis. Their Indications in Meningeal Syphilis.—At first sight, but only at first sight, the subarachnoid route appears an ideal procedure to exert an action directly on the nervous lesions of syphilis. Successive attempts have been made to introduce by this route mercury (Sicard

and his associates), arsphenamin (Ravaut), neoarsphenamin (Marinesco and Minéa, Marie and Levaditi, Ravaut, Jeanselme, Vernes and Bloch, Tzanck and Marcorelles), and salvarsanized serum (Swift and Ellis).

Aside from a few cases of secondary meningitis that have failed to improve under intravenous injections, the results obtained are not manifestly superior to those commonly observed under intensive treatment without intraspinal injections. On the other hand, untoward happenings are many and serious.

The reasons for the lack of success are as follows:

1. Workers in this field have been somewhat fascinated by the conception of meningeal impermeability. Drugs like chloral hydrate and morphine may not appear in the subarachnoid space and yet act on the nerve centers.

2. Will a drug introduced by the subarachnoid route impregnate the neuraxis more deeply than if it is given otherwise? Not at all. It is equivalent to an injection into the lymphatic channels instead of into the venous channels (Milian). Indeed, any drug injected into the subarachnoid space can be found in the thoracic duct within a very short time.

Again, the untoward results are also easily explained. To determine the dose that could be injected into the meninges, recourse had been had to comparative pathology.

Animals had withstood certain doses (Camus), and these doses could therefore be injected. In reality, these doses brought on spinal disturbances going as far as a flaccid paraplegia. The neuraxis with syphilitic involvement is thus evidently more easily harmed than the normal neuraxis.

The intraspinal method should be discarded in the presence of nervous syphilis.

At most, in order to enhance the effects, may aspiration by lumbar puncture be combined with intravenous injection (Tzanck). On the other hand, in refractory secondary meningitis, the procedure remains effective and harmless.

My conclusions are the same as in 1914: "If we bring together, on the one hand, the instances of benefit obtained without untoward results, and, on the other, the harmful effects, without manifest benefit, we segregate our cases into two groups which oppose the cases of secondary meningeal syphilis to all those of late nerve syphilis."

2.—In the Tertiary Stage.—Syphilis may give rise to cases of **neuro-vasculitis with parenchymatous degeneration (softening, hemorrhage)** and of **focal gummatous degeneration**.

These manifestations are not ordinarily beyond the help of present-day treatment, and yield more or less completely to energetic treatment by arsenic and mercury with or without addition of the iodides.

Thus, the following plan may be followed:

(a) A series of twelve daily intravenous injections of 0.01 gram ($\frac{1}{10}$ grain) of mercury cyanide.

Or, daily intramuscular injections of mercury biniodide, 0.02 to 0.04 gram ($\frac{1}{3}$ to $\frac{2}{3}$ grain) according to tolerance.

Or, suppositories containing 0.03 to 0.06 gram ($\frac{1}{2}$ to 1 grain) of mercurial ointment.

(b) A series of six to eight intravenous injections of 0.15 to 0.75 gram of neoarsphenamin, administered five days apart.

Or, if impracticable, an enema of the same dose dissolved in 100 cubic centimeters ($3\frac{1}{3}$ fluidounces) of physiologic salt solution.

(c) In the intervals between injections, daily administration of 1 to 4 grams (15 to 60 grains) of potassium iodide.

3. **Chronic nervous syphilis**, and more particularly **tabes dorsalis** and **general paralysis**, were termed **parasyphilitic disorders** by Fournier, who wished thereby to bring out the syphilitic origin of these conditions together with their incurability by the recognized methods of antisypilitic treatment in use twenty-five years ago.

Have the present means of treatment brought about any change in this incurability? Possibly they have, although the impassioned communications of the specialists in this field show a singular lack of accord as to the form of treatment to be given and the interpretation of the results. Sicard, Milian and Leredde, who have devoted special study to this question, are far from having reached concordant conclusions. The time is not yet ripe for a positive consideration of the matter. We shall return to it later, however, in connection with the concrete clinical states, **tabes** and **general paralysis**.

At all events, Sicard advocates, in the treatment of chronic nerve syphilis, the method of small repeated doses of neoarsphenamin continued for a long time. He gives every two or three days, and in many more cases daily, intravenous injections of 0.15 gram. The total number of these injections averages 30 to 50.

Is this method attended with risks? Sicard, Haguénau and Kudelski reply to this question in the negative. On the contrary, they deem this the only method that can protect the patient from the serious complication, nearly always fatal, known as **serous apoplexy**.

The principle which these observers defend is as follows: "For a **given** total amount of neoarsenic injected in a given period of time, the injections administered daily or on alternate days in small doses

afford a degree of safety and harmlessness that cannot be claimed for the weekly injections. Thus, 8 grams of neoarsenic, administered in the course of two months, will more certainly protect the patient from all untoward result by the small-dose method than by the weekly-injection method."

The method of frequently repeated injections seems to have as an advantage the breaking up of anaphylaxis. Indeed, in his experience with this method, comprising over 100 cases of chronic nervous syphilis (carefully followed for six to eighteen months), *i.e.*, in individuals in a state of lowered resistance, and who received an average of 30 to 50 injections, Sicard never saw any anaphylactic manifestations. There were two cases of death in cachectic subjects which could have been avoided. These two cases constitute the only unfavorable occurrences witnessed in connection with the method of small daily doses, in contrast to the many instances of improvement observed, of which some were very striking, even in general paralysis.

Again, with equivalent amounts of the drug, the results appear very perceptibly superior with the small-dose procedure than with that involving weekly injections, whether with ascending or constant doses.

"The treatment with neoarsphenamin," these observers assert, "is a potent treatment which gives successful results where all other measures have failed; it must, however, be properly managed. In order that it may act with maximal efficacy in chronic nervous syphilis it must be kept up for a sufficient time, in small repeated doses, within the bounds of caution and safety, and under the guidance of certain tests, *vis.*, the skin reactions, the Achilles tendon-reflex and the blood nitrogen; to these we may add the elimination of arsenic in the body-fluids, when the chemists shall have developed for clinical purposes a practical method of quantitative arsenic determination."

TABES DORSALIS.—At the present time, just as it did thirty years ago, the treatment of tabes combines the following four types of measures:

Pathogenetic treatment, directed at the cause, *i.e.*, syphilis.

Pathologic treatment, directed at the pathologic process which is going on.

Symptomatic treatment, directed at the symptoms, more or less painful and serious.

Suggestive treatment, many historic instances having shown that suggestion may be a very active measure, or at least one by no means

to be despised—not, to be sure, to cure, but to allay some of the symptoms.

I. Pathogenetic Treatment.—Tabes is of syphilitic origin—this is the first and decisive feature in this connection.

It is refractory to all syphilitic medication—such was the conclusion expressed twenty-five years ago; hence the term “parasyphilitic” used by Fournier to emphasize the syphilitic nature of the disease as well as its incurability by prevailing methods of treatment.

Since then, syphilis has not materially changed, but antisiphilitic treatment has become much more potent and bold. What influence has this had on the second proposition above expressed?

It is rather difficult to formulate a general conclusion, as both facts and opinions are still rather contradictory.

Regular, prolonged, intensive mercurial treatment, formerly held ineffective, is recognized as producing a manifest effect on many of the symptoms of tabes (visceral crises, lightning pains, sphincter disturbances, ocular paralyses, trophic manifestations, etc.), but the objective phenomena (loss of reflexes, Argyll-Robertson pupil) have so far proven inaccessible to our therapeutic endeavors. Many observations even tend to show that such an intensive treatment may be dangerous and favor extension of the nervous degenerative process.

In recent times, many attempts have been made to bring the remedy into contact with the nerve centers by the intraspinal injection of mercurial solutions. It is impossible at present to pass definite judgment on the value, suitability, efficacy and harmfulness of these procedures. There seems to be no doubt, however, that this is a treatment to be adopted in the future, to be tried particularly when the cerebrospinal Wassermann and Vernes reactions are positive.

The same is true of **arsenical treatment**, particularly with the arsphenamins. There is no doubt that, under such treatment, many tabetic symptoms (visceral crises, lightning pains) may diminish or even disappear. I have personally observed many convincing cases illustrating this fact. But never, it appears, has an actual retrogression of the objective signs (Argyll-Robertson pupil and the reflexes) been witnessed. In short, as with mercury, along with instances of improvement, untoward results, even fatal, have been recorded.

No one need wonder at this when he considers that tabes dorsalis, or specific progressive degeneration of the posterior columns of the cord, cannot escape from the general law relating to all degenerative processes, that it is progressive, beginning from a process of meningovascularitis, syphilitic, and at first almost completely curable, spontaneously or through antisiphilitic medication, leading later, however,

to permanent and progressive cicatricial fibrous infiltrations—incurable injuries which no treatment can repair.

Bismuth treatment yields notable improvement in many cases (injections of quinby, muthanol, etc.). The treatment has to be continued a long time, in courses of injections separated by intervals of varying length.

Practical Conclusions: 1. *Diagnose and treat syphilis as early and as energetically as possible*; this is the best way to obviate the secondary neurovascular involvements.

2. *Diagnose and treat as early and as energetically as possible the secondary or tertiary meningovascultides*; this is the best way to obviate the irreparable neurovascular degenerations.

3. *Diagnose and treat as early and as energetically as possible (but with due caution) the syphilitic nervous and vascular degenerations, and incomplete, incipient tabetic cases*; this is the best way, if not of causing retrocession of these degenerations, which too often are incurable, at least of arresting the progressive morbid process and sometimes of exerting a favorable influence on many symptoms through a curative action on the specific element that is still active and accessible—and this is feasible much oftener than is generally supposed.

4. *Do not persist, however, nor push the treatment to an exaggerated extent* in cases in which observation shows that the disease is beyond the reach of our present therapeutic resources and in which a toxic, degenerative action on the part of the compound used is to be feared.

II. Pathologic and Pathophysiologic Treatment Directed at the Pathologic Process and its Localization.

(a) Various forms of internal medication have been advocated, viz., general tonics, tonics to the nervous system, vascular tonics and remedies promoting oxygenation. They may be useful symptomatically by improving the general condition, but they are certainly devoid of effect on the lesion itself. Among the most celebrated of the combinations that have been used are:

(1) *Erb's pills:*

℞ Ferri lactatis,
 Extracti cinchonæāā 0.05 gram (gr. $\frac{3}{4}$);
 Extracti nucis vomicæ 0.01 gram (gr. $\frac{1}{6}$);
 Extracti gentianæ q. s.
 Ft. pil. No. i. Da tal. No. xl.
 Sig.: Two pills daily after meals.

(2) *Grasset's ergot pills:*

℞ Ergotæ 0.05 gram (gr. $\frac{3}{4}$);
 Extracti gentianæ q. s.
 Ft. pil. No. i. Da tal. No. xl.
 Sig.: Two pills daily after meals for ten days in each month.

(3) *Arsenic and iodide.*

Prescription of these agents, either singly or combination, is a time-honored, routine procedure.

℞ Sodii arsenatis	0.1 gram	(gr. $\frac{1}{6}$);
Potassii iodidi	10	grams (3iiss);
Aquæ destillatæ	300	c.c. (f3x).

M. Sig.: One tablespoonful twice daily after meals in periods of twenty days, with interruptions of variable duration.

It is very hard to say if any one of these measures exerts some effective action. At the most, the iodide may be looked upon as a rational adjunct of the antisiphilitic medication.

(4) *Organotherapy.*—Various attempts have been made in this direction, including the administration of calves' marrow, suprarenal gland, thyroid gland, testicular substance (Brown-Séquard), etc., none of which, however, seem to have afforded any clinical observations of practical utility.

(b) **External Measures.**—1. The first group of these measures may be summed up in the single word: **Counterirritation.**

All the counterirritant measures have been and are still being used with the object of producing an effect on the inflammatory and degenerative process in and about the spinal cord: Cauterizations, mustard, blisters, ionization, effluve treatment, etc., are commonly availed of along the spinal column in the dorsolumbar region.

They do not seem ever to have produced any noticeable effect on the objective phenomena (reflexes, Argyll-Robertson pupil), but, as with the measures already referred to, many patients experience a more or less pronounced and lasting favorable action therefrom on some of the tabetic symptoms (especially the pains). It is not possible to say how much of this relief is due to the counterirritation itself and how much to suggestion. As a matter of fact, counterirritation is a measure sufficiently useful to be recommended in nearly all cases.

2. Many other external treatments have been and are still in daily use. It may be said of their purely empiric employment that such employment is not founded on any positive or even probable clinical or pathologic data. In every disorder that is almost incurable, however, one is almost inevitably driven to employ for a "pitiful" and psychotherapeutic purpose various treatments not deserving of the faith or the authority with which they are prescribed. This is certainly the case, in this connection, with warm hydrotherapeutic measures, sulphur baths, the galvanic current, the effluve, and probably, with suspension, which was at one time used with success, but has

since practically passed into oblivion, although the process of radiculo-spinal elongation may not be devoid of all effect.

3. As for the treatment at **health resorts**, either one is dealing with an incomplete, incipient, beginning tabes, which one may attempt to check by more or less energetic specific treatment, and in this case it may be of advantage to send the patient to a resort affording waters that favor intensive mercurial treatment, *viz.*, the sulphur waters; or, the case is one of established, or even complicated, tabes, in which event the indication is purely palliative.

"As a general rule, either the complications are beyond medical help, as is the case with papillary atrophy, general paralysis combined with tabes, and the cerebral involvements, or the treatment resolves itself into the following two procedures: Motor reëducation and thermal treatment.

"Indeed, the question is no longer one of the institution of intensive treatment: The latter is useful during the stage in which maintenance of the case *in statu quo* will leave the patient in a quite bearable condition; but it is useless, if not prejudicial, in the major tabetics, and should be cast aside *a priori*.

"Motor training was first used alone; it gives very good results, and the success obtained by Fränkel in treating cases away from all thermal resorts is well known. Nevertheless, these favorable results seem incomplete, and even transitory, if the training is not combined with a systematic thermal cure.

"Long before the motor training of tabetics had been attempted, the favorable results of certain thermal cures had been experienced, although purely on an empiric basis; resorts such as Nérès, Bourbon-l'Archambault and Bourbonne had acquired a pronounced and deserved reputation in this connection. By adding motor reëducation to these favorable effects, the results were combined, and considerable improvement obtained. It is the intelligent combination of these procedures under the impulsion of Charcot and of Grasset that has yielded the favorable results obtained at La Malou."

4. Another therapeutic measure, introduced more recently, is that of **surgical intervention**. As a matter of fact, it has been directed chiefly to the relief of the *gastric crises* of tabes. The reason it is mentioned here is that the underlying principle is a general one, which may be applied to other tabetic and non-tabetic manifestations.

The peripheral origin of the condition (tabetic neuralgia of the sensory nerves of the gastric mucous membrane) being now accepted, in contrast to the central, bulbospinal origin formerly deemed established, the thought suggested itself of trying to interrupt by excision

the sensory pathway: Stomach, nerve branches making up the solar plexus, semilunar ganglia, great and lesser splanchnic nerves, ganglia of the sympathetic chain, rami communicantes and intercostal nerves from the 5th to the 10th dorsal, posterior roots and posterior columns.

Many operations directly on the sympathetic were carried out: Root sections (intradural rhizotomy, really very dangerous; extradural rhizotomy, between the intervertebral foramen and the dura), intraspinal dorsal gangliectomy after laminectomy (Sicard and Desmarests), avulsion of the intercostal nerves and spinal roots, or of the spinal ganglion and rami communicantes (Franke's operation), and stretching of the solar plexus (Jaboulay's operation).

For the sake of completeness mention may also be made of sub-diaphragmatic resection of the pneumogastric nerve, proposed by Exner and Von Eiselsberg.

The general impression obtained from a review of the literature on these operations is that the symptoms must be very severe and very obstinate to warrant recourse to procedures so uncertain, especially in view of the fact that even in the most favorable cases (and there are many that are disastrous), recurrence and recrudescence are the rule after a varying period of time.

III. Symptomatic Treatment.—Specific medication having yielded all that is to be expected from it, and the above-mentioned pathologic treatment having been applied with more or less success, it is, after all, the symptomatic treatment to which the therapist most often has recourse. This treatment is directed mainly against the following three tabetic symptoms: The pains in general and the lightning pains in particular; the gastric crises, and the motor incoördination (ataxia).

(a) **Pains.**—Aside from the foregoing specific and pathologic measures, recourse may be had, when required, to the whole series of *anti-neuralgic drugs*, which will be found enumerated and described in the section on *Neuralgia*.

1. External counterirritation, especially along the spinal column.
2. Various analgesics: Quinine, acetphenetidin, exalgin, pyramidon, acetylsalicylic acid, morphine.
3. Intraspinal injections of cocaine, stovaine, etc.
4. X-ray treatment of the cauda equina has sometimes given excellent results. Treatment of the lower dorsal and lumbosacral region by the "cross-fire" method has, however, yielded the most encouraging benefit. The exposures should be prolonged and grouped in series of four to six at fortnightly intervals.

(b) **Gastric Crises.**—1. I have had the great satisfaction of seeing rapidly yield to vigorous antisyphilitic treatment (mercury and arsphenamin) many severe and refractory gastric crises of long standing (several years) with hematemesis and transfixing pains, the tabetic nature of which had, in truth, not been recognized (the patients were considered as having gastric ulcer, and the syphilis overlooked). The first treatment to be instituted is the specific treatment.

2. For the gastric crisis itself, the following measures may be employed:

(A) Sedative local applications: Ice, hot applications, emollients and various sedatives.

(B) The usual gastric sedatives and analgesics:

1. Chloroform water in teaspoonful doses.

℞ Tincturæ belladonnæ 1 c.c. (℥.xv);
Aquæ laurocerasi 10 c.c. (fʒiiss);
Aquæ chloroformi q. s. ad 100 c.c. (fʒiiss).—M.

2. Extracts of cannabis, belladonna and opium:

℞ Extracti cannabis,
Extracti belladonnæ,
Extracti opii (N. F.) āā 0.01 gram (gr. ¼).
Ft. pil. No. i. Da tal. No. xv.
Sig.: Two to five pills a day, according to indications.

3. Cocaine or stovaine:

℞ Stovainæ 0.2 gram (gr. iiij);
Aquæ chloroformi q. s. ad 100 c.c. (fʒiiss).
M. Sig.: Two to four teaspoonfuls in the 24 hours.

4. Morphine or total opium extracts by hypodermic injection.

This is the sovereign remedy, to which one is compelled to have recourse.

It is, of course, desirable to institute a bland diet, preferably of milk, and to neutralize the gastric acidity with the customary alkalis (sodium bicarbonate, magnesia, lime, etc.).

Surgical Intervention.—As already pointed out, many kinds of surgical procedures have been proposed and attempted, with contradictory results, in the refractory and severe cases.

(c) **Motor Incoördination.**—The treatment of the ataxia may be summed up in two words, *viz.*, **motor reeducation**.

The technic of this measure is rather hard to describe in a concise manner. Many different plans of treatment have been suggested. Following is one of the most systematic of these plans. It should be taken, however, only as suggestive of one type of motor training,

for which many other types might be substituted. It is taken from Marie's summary of an article by Grossman entitled "Maloney's Method in the Treatment of Ataxia" (*Med. Record*, Aug. 16, 1919):

The basic principle of this method, which combines psychotherapy with physical therapy, is to teach the tabetic patient to form a perfect conception of the movement he is to execute, and for this purpose to begin by making him passively go through definitely prescribed movements. A close mutual relationship exists, indeed, between the mental state of the tabetic and the symptoms he presents.

The treatment begins with a series of passive exercises carried out in a dark, quiet room. The patient, lying on a very narrow bed, is first made to carry out deep, regular respirations, separated by regular pauses, his attention being concentrated on these movements and sandbags on the abdomen being employed to prevent them from becoming unconscious as well as to increase gradually the muscular effort put forth. Next, complete muscular relaxation is obtained by passive movements of all the joints; the time when it has been secured is marked by paucity of the winking movements of the lids, reduction of blood-pressure and slowing of the pulse. These exercises are continued for forty-five minutes, interspersed with short rest periods, and must be repeated four or five times a day.

In a *second stage*, the tabetic patient is trained to exercise his brain control by making him carry out movements of carefully predetermined force, amplitude, direction and frequency. The subject should be blindfolded in order to exclude the visual images of the movements and cause him to acquire a more acute perception of the sensations originating in the muscles, which is necessary for the re-education of the position sense. He is first taught to assume correct postures, in the sitting position, next on all fours, then kneeling, and finally standing up. At the same time, he is made to carry out very gradually exercises involving at first the non-ataxic members and comprising passive movements with gradual resistance on the part of the patient, next guided active movements, then active movements without guidance, and finally active movements against increasing resistance, the complexity of the movements being gradually increased. When the movements are executed to perfection in the recumbent position, the patient is taught to carry them out on all fours, then while kneeling, and finally standing up.

"At the beginning of the treatment, and only temporarily, it may be of advantage, in order to check the development of the ataxia, to resort to a few orthopedic procedures, which are given up as soon as the patient has regained cerebral control over his movements: A

special, high and rigid boot, with a broad sole, corresponding to the shape of a foot, and bands playing the part of temporary muscles, in order to antagonize faulty positions."

This method constitutes, indeed, only the early preliminary stage of the treatment. In the later stages, the method of *progressive reëducation of the muscles* has long since been described in the utmost detail in special monographs such as that of M. Faure ("*La rééducation motrice*," Paris, 1902).

GENERAL PARALYSIS.—Progressive general paralysis or chronic pachymeningitis, long considered a parasyphilitic condition, is undoubtedly a particularly serious localization of syphilis, which has hitherto shown itself almost wholly refractory to all treatment.

The classic antisyphilitic treatment with iodides and mercury, even when intensively carried out, has been shown to be ineffective. This was, indeed, the reason which led Fournier to term general paralysis a parasyphilitic disease, the condition being little influenced by antisyphilitic treatment though of syphilitic origin.

The positive demonstration of the syphilitic nature of the disease (positive Wassermann reaction in the cerebrospinal fluid, spirochetes in brain sections) and the discovery of the antisyphilitic properties of the arsenobenzols led to a recrudescence of therapeutic endeavors.

Among the procedures tried have been the following:

(a) *Repeated weekly intravenous injections of neoarsphenamin*, 0.3 to 0.6 gram. Sicard reported improvement in the mental symptoms under this treatment. The blood and spinal fluid reactions were not affected.

(b) Very intensive combined *mercurial treatments* (injections, rubs, ingestion). The results remain the subject of much discussion and are very questionable. Even instances of apparently unquestionable aggravation have been observed.

(c) *Intraspinal injections of salvarsanized serum*, the results of which have so far been either indifferent or disastrous. Seemingly, it may be asserted that in weak dosage (up to 0.005 gram) these injections are without any marked effect and that in larger doses (above 0.01 gram) they are dangerous.

(d) *Cerebral subarachnoid, or even intraventricular, injections through a trephine opening* (Sicard and Lapointe, Marie and de Martel, Skoog and Menninger). These procedures have not gotten beyond the experimental stage.

Sicard, in nervous syphilis in general, and in general paralysis in particular, has been applying **arsenical treatment in doses not previously attempted.**

Daily for two or three consecutive months he has injected intravenously 0.15 to 0.3 gram of neoarsphenamin, dissolved in 2 cubic centimeters of distilled water (Ravaut's method), thus causing paretics to take in from 10 to 18 grams of the drug, with repetition of the same treatment after an interruption of several weeks.

This method of daily intravenous treatment with small doses for a long period is deserving of attention.

Sicard was surprised to see how readily, thanks to this procedure, the arsenical compound was borne by patients with nerve syphilis. In none of the 50 cases which received such treatment was there any nitritoid attack or serous apoplexy. The only two untoward effects witnessed were erythematous and neuritic reactions.

As for the results, they are asserted to have been most encouraging. In nearly all of the cases there occurred a distinct improvement in the clinical symptoms, and in two patients the cerebrospinal Wassermann was reduced; from positive it became completely negative, and the albumin and cells likewise returned to normal. Up to that time it had never been possible by any method to eliminate the positive spinal Wassermann in a paretic patient.

Sicard concludes, then, that "this new application of the neoarsphenamin treatment represents, in general paralysis, the most intense, effective, readily executed and best tolerated treatment—with the equivalent amount of drug used—that has so far been proposed. It seems to afford in the best possible manner a sustained and cautious continuity in the therapeutic effect."

* * *

For suggestive purposes only, mention may be made of the method which consists in combining mercurial treatment with **tuberculin**—the latter intended to induce an artificial fever. Alternate daily injections of a soluble mercurial salt and of ascending doses of Koch's tuberculin are given, the dosage of tuberculin being gradually increased from 0.0005 to 1 gram, in accordance with the febrile reactions. Remissions in the disease are stated to have been obtained. The treatment is based on the observation of remissions stated to have taken place in general paralysis as the result of intercurrent infections.

[The febrifacient treatment by **malarial inoculation**, introduced by Wagner-Jauregg, consists, as described by Pilcz (*Lancet*, Jan. 6, 1923), in injecting into the paralytic patient 2 cubic centimeters of blood obtained during a malarial attack from a case of tertian malaria previ-

ously untreated by quinine. After ten or twelve malarial paroxysms have resulted, the malaria is checked with quinine and neoarsphenamin administration started in doses of 0.3 gram intravenously once a week, ascending to 0.6 gram. Of 141 paretics treated, 51 are stated to have completely recovered, while 18 showed a persistent remission, 57 became stationary or showed an incomplete remission, and 15 died. The remissions and serologic reactions showed no parallelism. —Tr.]

* * *

The **symptomatic treatment** of the **excitement** consists of physical and mental rest, in isolation; a non-stimulating diet; sedative hydrotherapeutic procedures, and valerian, bromides, etc., if required. Complications such as bedsores may also demand appropriate treatment.

Very frequently, as is well known, the psychosis becomes so pronounced as to preclude isolation at home and necessitate incarceration in a public or private asylum.

* * *

That true general paralysis is *always of syphilitic origin* appears now to be universally recognized. The practitioner should, however, not lose sight of the fact that there occur cases of **pseudo-general paralysis** dependent upon a process of ordinary atheromatous degeneration of the cerebral vessels and clinical differentiation of which from true paresis is often a difficult matter. Klippel, who was the first to describe these conditions, designated them by the term *arthritic pseudo-general paralysis*. Since then, many cases have been reported under the appellations *arteriosclerotic dementia* (Alzheimer), *cerebrosclerous pseudo-general paralysis* (Robert) and *arteriosclerotic psychosis* (Ladame).

THE INFECTIOUS DISEASES,

(Written with the collaboration of A. LUTIER, M.D.)

GENERAL TREATMENT OF THE INFECTIOUS DISEASES.*

PROPHYLAXIS.—Pathogenic germs are suspended in the air, especially adhering to dust particles, lie on the ground, or are carried about by streams of water.

The mucous membranes constitute the commonest portals of entry for the germs.

Transmission of the pathogenic germs takes place sometimes in a direct manner through immediate contact (syphilis, gonorrhea, tuberculosis, etc.), but more frequently in a mediate fashion through the agency of dust, dried excreta, clothing, etc., as well as through certain insects (malaria, yellow fever, etc.).

Prophylactic or preventive therapeutics may be brought into action in two ways:

I. By destroying the pathogenic germs and inhibiting the virus before it has entered upon a conflict with the human organism.

II. By increasing the resistance offered by the human organism.

I. Hygiene and Disinfection.—The destruction of germs forms part of hygiene. The principal measures at our disposal for the purpose include the destruction of all contaminated objects, attempts to prevent propagation of the germs by carrier agencies, isolation of the patients and suspects, disinfection of the premises, institution of quarantines, and closure of schools or barracks.

It is incumbent upon the practitioner to instruct families and nurses as to the hygienic precautions to be taken, to specify the suitable disinfecting agents and to give directions for and supervise their use.

The principal preventive measures to be taken in a case of infectious disease are as follows:

1. *Report the disease, as required by law, to the health authorities. (This applies chiefly to smallpox, scarlet fever, measles, diphtheria, typhoid or paratyphoid fever, cerebrospinal meningitis, acute poliomyelitis, tuber-*

* See also the sections on *Serum Therapy, Vaccine Therapy, Protein Therapy*, etc., in Volume I.

culosis, whooping-cough, mumps, chicken-pox, and anthrax; in some localities also to pneumonia, influenza, erysipelas, syphilis, gonorrhea, chancroid and scabies.)

2. *Isolate the patient from the start; the infectious diseases are generally most easily transmissible in the stage of invasion.*

3. *Disinfect the morbid products.*

The *sputum*, false membranes or oral secretions should be collected in receptacles half filled with a 10 per cent. solution of sodium hydroxide or 2 per cent. lysol or a solution of cresols. The material should remain in contact with the disinfectant at least one hour. From time to time the receptacle should be boiled in water to which sodium carbonate has been added.

The *excreta* (stools, vomitus, urine) should be collected in suitable vessels containing a disinfectant solution in an amount equal to at least one-half of the bulk of the excreta (milk of lime; strong solution of cresols; Javelle water). After three to six hours of contact, they may be poured into the toilet.

The matter issuing from smallpox pustules, scarlet fever desquamation, etc., should be destroyed by burning or by boiling water.

4. *Disinfect the linen, clothing, etc.*

The *linen*, towels, etc., should be placed in a special bag to be removed regularly for disinfection in a steam autoclave under pressure.

They may also be disinfected in the home by being placed in a boiler containing Javelle water (heat to 60° C. or leave in contact for twelve hours in the cold) or a 4 per cent. solution of cresols (leave in contact at least six hours). They may also be boiled for an hour with sodium carbonate or wood ash.

The *clothing* should be disinfected in the autoclave or spread out over cords fastened across an enclosed space in which formaldehyde vapor is liberated for ten hours.

Kitchen utensils, including glasses, plates, etc., should be immersed in boiling water before they leave the room.

Books and toys should be burned or disinfected with formaldehyde.

5. *Disinfect the patient's body.*

Wash soiled portions of the body with an antiseptic solution.

Milne's method, to be described later, is the best procedure for body disinfection.

A patient who has gone through a contagious disease should not be allowed to return to his customary family life until after he has taken one or two baths with free use of soap, and thereafter donned clean underwear and new or disinfected clothing.

6. *Disinfection of persons who go near the patient.*

Nurses should observe the following rules:

(a) Keep in the sick-room a gown closing tightly about the wrists, which is to be removed before she leaves the room.

(b) Hands to be washed with soap and brush after every contact with the patient or his garments, and to be then immersed in an anti-septic solution (lysol or mercury oxycyanide or bichloride); face to be washed every time it is soiled with mucous discharges from the patient.

(c) No food nor drink to be taken while in the room.

(d) Avoid contact with mucous discharges expelled in coughing spells, which are, in general, a source of contagion.

7. *Disinfection of toilets, etc.*

Pour in a 5 per cent. solution of copper sulphate or freshly prepared 20 per cent. milk of lime.

8. *Disinfection of the bedding upon termination of the case.*

Bedding to be disinfected under pressure in the autoclave.

If this is not feasible, the blankets should be immersed in a solution of soft soap, prepared with 250 grams (8 ounces) of soap to 10 liters (quarts) of water; after two hours' contact, the solution should be heated to boiling.

The mattresses, pillows, etc., may be taken apart after having been subjected to prolonged spraying with a disinfectant solution. The outer coverings may then be washed with lye, and the contained hair, wool or feathers immersed and washed in the cold in a solution of cresols (twelve hours' contact).

9. *Disinfection of the room.*

This should be carried out by the Board of Health or some officially authorized disinfecting service.

(a) Bichloride disinfection: Flooring to be washed with a 1:1000 solution of corrosive sublimate. Same solution to be sprayed over the walls, furniture, etc.

(b) Formaldehyde vapor disinfection, with the room sealed for twelve hours.

II. Vaccination.—The powers of resistance of the human organism may be increased by specific means, *viz.*, vaccination or preventive immunization.

To effect such immunization, the system is inoculated with the infectious disease itself in a diminutive form: Either a weak virus, attenuated in some way or other (physico-chemical agents, passage through certain media or animals), in which case a vaccine is obtained (see Part I: *Vaccine Therapy*).

Or, bacterial products formed in another organism which is naturally refractory or has been made so artificially. The substance injected consists of the body fluids, in particular the blood serum. *Preventive serums* are thus obtained (see Part I: *Serum Therapy*).

* * *

PROPHYLACTIC INSTRUCTIONS.—The Sick-Room.—The room in which the patient is isolated should be sufficiently large, with a southern exposure, if possible, and freed of unnecessary furniture.

An open fire-place is useful to assist in ventilation.

The temperature of the room should be kept fairly cool.

The air should be changed several times a day, precautions being taken to avoid exposure of the patient. (The patient should be covered with the bed-clothing and protected by a screen while the windows are open.)

The bed, preferably a narrow one, should be so situated that the attendant can walk freely around it.

It is well to have, in addition, a couch to which the patient can be carried morning and evening while the mattress is being turned over and the sheets changed.

The patient should not be overloaded with blankets, quilts, etc.

A screen should be at hand to shut off bright light or drafts.

The room should be quiet; no visitors nor unnecessary conversation.

It should be cleaned with a wet cloth. No dry dusting should be permitted.

Water containing eucalyptus leaves or menthol may be allowed to evaporate in the room.

Absolute cleanliness of the linen and of the patient's body are required. The face and hands should be washed twice a day with soap and water to which a few drops of lysol have been added.

Women's hair should be braided. Frequently, in severe infections, such as typhoid fever, it is well to cut the hair short, as it will nearly always fall out anyhow at the close of the illness.

The tongue should always be roseate and moist.

The mouth should be washed out every two hours with warm water to which a little sodium bicarbonate has been added, and in particular, each time the patient receives milk.

Morning and evening, the patient should clean his teeth and gums.

If his condition does not permit of the above procedures, the gums and tongue should be cleansed by the attendant with a pledget of cotton moistened with a dilute alkaline solution or glycerin.

The genital, anal and intergluteal regions should be the object of special care morning and evening and after each act of defecation, especially in obese individuals. The parts should be washed with cotton, soap and water to which a few drops of lysol have been added, then carefully dried and dusted freely with talcum powder.

Milne's Method.—The nose, throat, eyes and skin surfaces should be dealt with by Milne's method, especially in the eruptive fevers.

1. Ocular instillations of 1 per cent. argyrol solution repeated, on an average, three times a day.

2. Nasal instillations of 5 per cent. gomenol in oil, three times daily.

3. Painting of the tonsils and pharynx as high up and as low down as possible with 10 per cent. phenol in oil, every two hours on the first day, then three times a day.

For this purpose a cotton pledget of the size of the distal phalanx of the thumb is used, well impregnated with the phenol and oil and mounted on a long and slightly curved sponge-holder.

4. Gentle rubbing over the entire body surface from the scalp to the soles of the feet, morning and evening for the first four days, then once daily (up to the tenth day in measles, and up to the twentieth or even the thirtieth day in scarlet fever), with oil to which tincture of eucalyptus has been added.

5. In diseases associated with nervous disturbance and cough, such as measles, a large hoop bearing a piece of thin, transparent gauze, stretching over a part of the bed, to be sprinkled with oil of eucalyptus, may be placed over the patient's head and chest.

Thanks to this method, the child contacts do not need to be strictly isolated. They are made to live in an atmosphere of eucalyptus by placing 10 or 15 drops of oil of eucalyptus on a piece of linen which they carry about with them and by sprinkling a little of it also on their pillows. They are kept in the house a day or two—long enough to disinfect and aromatize them.

* * *

The Diet.—At first the patient should receive mainly an *abundance of warm fluids*. In the eruptive fevers hot infusions of burrage or marsh-mallow may be ordered. Lemonade and water flavored with some form of syrup may be allowed. Weak alcohol preparations may be used in the adynamic or complicated forms of bronchopneumonia or heart weakness.

Milk is particularly to be recommended, as it constitutes an almost perfect physiologic food which is easily borne and assimilated. Two to three liters a day of it should be given in cupfuls of 250 cubic centimeters (8 fluidounces) each every 2½ hours. It may be mixed with Vichy water, tea or coffee, or a few drops of brandy added. Sometimes it is necessary to facilitate digestion of the milk by adding to each cupful a definite amount of rennin; or the so-called "homogenized milk," or kephyr, may be resorted to.

Vegetable broth.—If milk induces abdominal distention or diarrhea, or if the stools contain undigested curds, vegetable broths to which various kinds of flour have been added should be substituted.

A *cereal decoction* is also very serviceable.

As soon as defervescence becomes advanced, the patient may be allowed weak cocoa with milk, clear soups made from skimmed broths, or better, from vegetable broth, light gruels with cream of rice or of barley, fine oatmeal, etc.; then strained and slightly salted boiled bread, mashed potatoes, well-cooked rice cakes or mush over which sweet fruit juices have been poured, and creamy preparations.

* * *

ANTIBACTERIAL TREATMENT.—The future of antibacterial treatment is bound up with chemotherapy and serum therapy, but the number of diseases amenable to such measures is still limited, and one must perforce have recourse to other therapeutic weapons that have no direct action on the germ but enhance the defensive processes of the organism.

Thus, aside from the cases for which we possess either a bactericidal therapeutic agent, such as quinine for the malarial plasmodium and mercury and the arsphenamins for the spirochete of syphilis, or a specific vaccine or serum producing a refractory state in the course of the infection, such as antirabic vaccine and the curative serums for diphtheria, meningococcus infection, dysentery and plague, we are compelled to resort to functional therapeutics, which has for its purpose to protect the body cells against the bacterial invasion by increasing their defensive reactions and accelerating the outgo of the toxic products secreted by the germs or resulting from the disturbances of cellular life. With these measures we do not cure the infectious disease, but sustain the body in its combat against them.

Colloidal Metals.—These drugs act on the defensive processes of the organism by activating the phagocytic power of the leukocytes and by inducing a reactional "shock" which sometimes leads to favorable results (see Part I: *Drugs Acting on Infectious Disorders*).

They lower the temperature, rather often after having first evoked a febrile response, and improve the general condition.

Collargol, or more particularly electrargol, should be used. Gold colloidiase produces sharper reactions which are sometimes alarming. The other metals do not appear to possess any special advantages.

Intravenous injections should mainly be resorted to, or, if they are impracticable, intramuscular injections.

Metallic Ferments.—Injections of minute amounts of metals in finely divided form (silver, gold, platinum, palladium, etc.) produce very considerable chemical effects (Robin), *vis.*, increase of urea, of the coefficient of nitrogen utilization, of the respiratory coefficient, etc.

There is an increasing tendency toward recognition that the action of the majority of the intravenous injections carried out for anti-infectious purposes depends much less on the exact nature of the substance injected than on the extent of the hematic responses elicited by the abrupt introduction of a foreign substance into the blood serum. Accordingly, it is always best to employ for such injections substances that are harmless *per se* and are easy to prepare and use, such as glucose and cane sugar, the colloidal metals, and peptones.

Sodium Nucleate.—Subcutaneous injections of this drug appear to have a very distinct action on leukocytosis. Chantemesse showed that they were capable of acting favorably in typhoid fever when there is threatened intestinal perforation. The drug should be used in a sterilized 5 per cent. solution in ascending doses of from 5 to 20 cubic centimeters ($1\frac{1}{4}$ to 5 fluidrams). To reduce the pain occasioned by the injection, this solution should be diluted with from 2 to 10 parts of physiologic salt solution.

The Fixation Abscess.—Subcutaneous injection in the thigh of 1 to 2 cubic centimeters (15 to 30 minims) of fresh oil of turpentine (a few drops only in children) leads to the formation of an abscess intended to fix the poisons or germs at that one point of the body.

The indications for the procedure are many: General infections with septicemia, puerperal sepsis, lobar pneumonia, severe bronchopneumonia, typhoid fever of the septicemic type, cerebrospinal meningitis, severe smallpox, pseudo-infectious rheumatism, general streptococcus and staphylococcus infections.

This measure is, however, to be employed only in exceptional cases, in which the usual treatments have failed, or when a threatened suppurative or visceral complication is feared.

It is likewise true that one should not wait to use it until the patients are moribund, for its effect is based on a reaction on the part of the body itself. In patients already adynamic, pulseless and in

collapse, the fixation abscess cannot be of any service. A few unfortunate cases on record show that it is an exceptional form of treatment, which should be employed only with the greatest caution.

* * *

ELIMINANT MEDICATION.—Defervescence and convalescence are generally accompanied or preceded by *precritical discharges* of waste material which can be carried through only with the assistance of increased diuresis.

Increased Intake of Fluids.—The patient should be given at least 3 liters of fluid in the twenty-four hours, consisting of $1\frac{1}{2}$ to 2 or 3 liters of milk, or if less milk is given, $\frac{1}{2}$ to 1 liter of vegetable broth. The remainder of the fluids taken should consist of lemonade, a maceration of cinchona, a weak coffee infusion, or water mixed with syrup.

Except in the eruptive fevers, the fluids are better taken cold, as warm drinks are less readily borne by the stomach and are less diuretic.

Diuretics.—If the increased fluid intake is not sufficient to keep the urinary output at a reasonable figure, one might give lactose, 60 grams (2 ounces) to 1 liter of fluid; digitalis in small doses; caffeine in a liquid preparation, or diuretic infusions (juniper berries, cherry stems, etc.).

Physiologic Salt Solution. Glucose Solution.—These solutions raise the blood-pressure, increase urinary excretion and “wash” the blood.

They should be administered either by hypodermoclysis or by the rectal drip method with Murphy’s device.

Good results are obtained especially in post-operative infections, in choreiform infections with dehydration of the system, in hemorrhage (intestinal hemorrhage in typhoid fever), in low blood-pressure (*e.g.*, in Asiatic cholera), and in oliguria or even anuria (cholera, scarlet fever, etc.).

Physiologic salt solution should not, however, be used without definite indications. In the fastigial stage of infections, a retention of the extractive substances, especially the chlorides and urea, occurs. A saline injection cannot but aggravate the chloride retention, and it may bring on serious subcutaneous or visceral edema.

Glucose solution is free from these disadvantages. (See Part I: *Artificial Serums.*)

ANTIPYRETIC TREATMENT.—(See also the section on *Fever.*)—Fever is merely a reactive condition manifesting the defensive

activity of the system and its condition of intoxication. The thing to be combatted is this toxic state itself.

Furthermore, antipyretic medication is attended with various risks. The antipyretic drugs reduce the nervous erethism, lock up the kidney to the toxic products, and depress the heart.

1. Antipyretic Drugs.—Acetanilid, acetphenetidin, exalgin, salophen, antipyrin, etc., should be avoided if possible.

Amidopyrin and sodium salicylate may be used, as they do not lower the output of urine and they increase nitrogen utilization and the activity of the liver.

Quinine—hydrobromide, sulphate or hydrochloride—in *small doses*—0.5 to 0.6 gram (8 to 10 grains) a day—is the antipyretic most to be recommended, as it exerts a tonic action, with regulation of katabolism; but larger doses should not be used.

To correct the depressant effects of all of the synthetic antipyretics on the nervous system, it is necessary to combine with them a small amount of caffeine—0.02 to 0.05 gram ($\frac{1}{3}$ to $\frac{3}{4}$ grain).

2. Hydrotherapy.—Hyperpyrexial forms of the infectious diseases are prone to be complicated with nervous disturbances, cardiac paresis, and frequently, incipient pneumonia.

Hydrotherapeutic measures should be applied immediately in such cases, and will often yield unexpected results:

Brandt's Method.—Indicated in hyperpyrexial cases with nervous disturbances.

The actual contraindications to cold baths are few. Aside from perforation, peritonitis, and intestinal hemorrhage in typhoid fever, they relate exclusively to the condition of the heart. Even heart weakness, however, demands certain precautions rather than complete abstention from the procedure. Neither the onset of menstruation, bronchitis, nor even pulmonary congestion requires discontinuance of the baths.

Tepid Baths (30 to 35° C.—86 to 95° F.—for fifteen to thirty minutes).—These are less unpleasant to the patient than cold baths, but do not have the stimulating action of the latter, and the refrigerant effect is less marked.

They suffice in the milder forms and in the stage of decline.

They may be employed in children and in pusillanimous patients.

Tepid Baths, with Gradual Addition of Cold Water.—These are indicated in aged subjects, in adynamic cases, where there is heart weakness, and in faint-hearted patients.

Cold Affusions. Cold Sponging.—These are sedative in action, but produce only a moderate reduction of temperature. They should be used in the milder forms, and in subjects with syncopal tendencies.

Wet Sheet.—This produces a more marked refrigerant action than sponging. It is used mainly in children and where a bath-tub is not available.

Hydrotherapy in Children:

Cold Baths.—The cold bath is stimulating, but for the stimulation to occur the patient must be capable of reacting. Its risks (collapse, effect on the heart) are greater in children than in adults. Accordingly, in children baths of a temperature of 26 to 28° C. (78.8 to 82.4° F.) are preferably used, yielding the same effects as baths at 20° C. (68° F.) in the adult. These baths should not exceed a duration of six or seven minutes.

Warm Baths.—Renaut advises warm baths (38° C.—100.4° F.) in children. Such a bath decongests the internal organs and lowers the blood-pressure; it has a sedative effect on the nervous system, without any stimulating action. It is to be preferred if the condition of the heart is dubious or if the patient is cyanotic.

* * *

MEDICATION IN THE ERUPTIVE FEVERS.—To promote the appearance of the eruption in the eruptive fevers, hot fluids and diaphoretic infusions, *e.g.*, of burrage, marshmallow, or elder-flowers, should be ordered. The patients should not, however, be covered with an excessive weight of blankets, quilts, etc., for the purpose of making them perspire.

An ordinary ammonium acetate preparation should likewise be given, to which may be added tincture of aconite and, in some cases, tincture of digitalis, which appears to favor the reduction of temperature. If there is restlessness, syrup of ether (2 per cent. of ether) may be added to the mixture.

If the eruption is scanty or there are brain symptoms, the eruption may be enhanced by administering rubs with spirit of camphor, by applying mustard poultices or by giving mustard baths.

* * *

TREATMENT OF COMPLICATIONS.

Nervous Complications.—*Restlessness* and *active delirium* relate to the hyperpyrexial and ataxic forms of infectious diseases. A bath at 20° C. (68° F.) should be given, together with cold affusions to the

head; cold compresses, frequently renewed, or better, an ice-bag to the head, should be used during the intervals between baths; syrup of ether (2 per cent.) may be given.

Convulsions.—When the “ataxic” state is combined with convulsions, the cold bath is too stimulating, and it is better to resort to the prolonged tepid bath with affusions. The use of the ice-bag should be continued. An enema of a bromide, 2 grams (30 grains), or of chloral hydrate, 2 grams, should be given.

Digestive Complications.—**Diarrhea.**—Intolerance of milk should be thought of in this connection and the measures described in the section on diet applied. Lactic acid lemonade should be given, and kephyr is of great service in these cases. If necessary, there may be added bismuth subnitrate, lime water, paregoric, or starch enemas with a few drops of laudanum.

Constipation.—Purgation should be ordered where there is constipation and the stools are insufficient or very malodorous. The saline purgatives are best, especially sodium sulphate. The milder laxatives may be used, e.g., castor oil, 10 to 15 cubic centimeters ($\frac{1}{3}$ to $\frac{1}{2}$ fluidounce), or one or two teaspoonfuls of magnesium oxide. Copious irrigations with cold water, stimulating the smooth muscle of the intestine, correct meteorism and contribute to reduction of the temperature.

Vomiting.—Complete starvation to begin with. Then, iced drinks in ascending amounts.

Iced milk with excess of sugar (boiled cow's milk with 10 per cent. of sugar) may be given.

Mustard poultices or an ice-bag should be applied to the epigastrium.

The vomiting is sometimes dependent upon a concomitant nephritis, which should be duly treated.

Pulmonary Complications.—In the event of *bronchitis* or *lung congestion*, dry or wet cups should be applied. Moist wrappings of the chest, with or without mustard, should be used. Injections of camphor in oil in large doses should be prescribed.

In *pneumonia* or *bronchopneumonia*, tepid baths made gradually cooler should be employed. In children, warm baths have been recommended. Wet cups should be prescribed, with wet chest packs, with or without mustard. In these cases, the heart should be treated as much as the lungs; hypodermic injections of strychnine, sparteine and camphor oil in large doses should be ordered.

On the basis of bacteriologic examination of the sputum, which may reveal the presence of pneumococci or of streptococci, hypodermic injections of antipneumococcus or antistreptococcus serum, 40

cubic centimeters on the first day and 20 cubic centimeters on the succeeding days, singly or in combination in accordance with the case, may be tried.

Circulatory Complications.—In a few of the severe cases, the heart may weaken already on the first day. Usually, however, this condition does not appear until the stages of acme or decline of the disease. It is accompanied by hypostatic congestion, oliguria, cyanosis and low blood-pressure, and may terminate in collapse.

1. Stop the cold baths, if such baths are being given, and resort, if there is need of further hydrotherapy, to tepid baths made gradually colder, or to cold sponging, or better, warm sponging, if there is collapse.

2. An ice-bag over the precordial region.

3. General stimulating rubs with spirit of camphor.

4. Stimulating alcoholic preparations.

5. Heart tonics: Tincture of digitalis or digitalin; caffeine in solution. A combination of digitalis with ergotin is to be recommended, the one acting on the heart, the other on the vessels.

6. Diffusible stimulants, such as ammonium acetate.

7. Hypodermic injections of strychnine, sparteine or camphor in oil. Injections of caffeine should be used only in grave cases demanding a rapid, powerful effect.

8. If there is collapse: Hot wrappings and vigorous rubbing.

9. Where asthenia and exhaustion are present in conjunction with a markedly small pulse and low blood-pressure, subacute adrenal insufficiency should be thought of and adrenalin given by the mouth in fractional doses—4 to 10 drops of the 1:1000 solution five to ten times a day.

10. In the event of marked syncope, the patient should be placed with the head low, given a vigorous rub, and wrapped in warm blankets. Hypodermic injections of ether may be given; also stimulating alcoholic preparations.

Whenever auscultation of the heart or the observation of indications of adrenal insufficiency suggest the probability of an oncoming circulatory depression, immobility in the horizontal position should be imposed.

Renal Complications.—In the event of nephritis, wet cups should be applied over the kidneys and the patient placed on a strict milk diet, then a diet of milk and vegetables.

Nephritis is not a contraindication to cold baths. In typhoid fever, however, when a late nephritis appears, it will always be advisable to begin with tepid baths.

The patient should be sharply purged with compound tincture of jalap.

Diuretic infusions (juniper berries, triticum, etc.) should be prescribed. If the output of urine is insufficient, theobromine or theobromine sodio-salicylate should be ordered.

In the presence of uremia, a purgative enema, *e.g.*, of sodium sulphate, 30 grams (1 ounce), in a decoction of marshmallow, 500 cubic centimeters (1 pint), should be given, one or two leeches applied behind each ear, and if necessary, venesection carried out.

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TREATMENT OF CONVALESCENCE.—Convalescence may be said to have begun when the temperature has been normal for forty-eight hours, the pulse is slow, the tongue clear, and diuresis copious.

Solid food may be resumed more or less rapidly, according to the case:

To begin with, the patient is given, in addition to the milk, cereal soups and one egg a day. Later he receives fish (trout, sole, whiting); then brains, chicken (white meat), beef cooked rare and chopped up in broth, lamb chops, sweet desserts, creamy preparations and fruit compotes.

If the tongue becomes coated and the temperature rises again without apparent cause, such feeding should be stopped and the feeding resumed as it was at the beginning of convalescence, after administration of a laxative.

To improve the convalescent patient's strength, a little red wine may be given, pure or diluted. Extract of cinchona may be prescribed, and later, arsenic preparations.

After a few days, the patient may be allowed to get up, more or less gradually, according to the extent to which he has been weakened by the disease.

He should then be sent to recuperate in pure air, in the country in preference to the seashore, for a period of six weeks or two months.

SPECIAL TREATMENT OF THE INFECTIOUS DISEASES.

ASIATIC CHOLERA.

Prophylaxis.—*Sources of infection:* Feces of patients, convalescents, or carriers.

Mode of transmission: Direct contamination, soiled linen, water polluted with the feces; flies, which carry the infection about.

Isolation should be strict.

Bacteriologic examinations of the stools of suspects should be made. The brevity of the incubation of the infection facilitates the quarantine of suspects.

During an epidemic, only boiled water should be drunk.

Preventive vaccination.—See *Vaccine Therapy*.

Preventive serum therapy.—See *Serum Therapy*.

Specific Curative Treatment.—See *Serum Therapy*.

Drug Treatment.—Two drugs in particular have been considered of value:

Lactic acid, much used during the epidemic of 1892 in Paris. It is prescribed in the form of 1 per cent. lactic acid lemonade (sometimes 1.5 or 2 per cent.); three tablespoonfuls to be taken every fifteen minutes. The lemonade should be taken in small mouthfuls, with cracked ice in between; in this way the patient is nearly always enabled to take it.

Calomel, recommended especially by English and American physicians. It is prescribed in small doses—0.3 to 0.5 gram (5 to 7½ grains) in the twenty-four hours. Some observers follow an initial dose of this size with 0.05 gram (¾ grain) every hour.

Symptomatic Treatment.—Dujardin-Beaumetz said, in reference to cholera: "Active treatment is harmful." Indeed, the cholera patient, at the onset and in the fastigial stage, has a greatly reduced power of absorption from the intestine; but in the stage of reaction, at the beginning of convalescence, the bowel suddenly regains its normal absorptive power, and at this time serious manifestations of drug poisoning have been observed, due to the abrupt absorption of accumulated drugs. *At the onset and in the fastigial stages, therefore, the giving of toxic remedies in large or repeated doses should be avoided.*

I. Incipient Cholera (which may be a premonitory diarrhea).—During an epidemic, the least attack of diarrhea should be treated as follows:

1. Rest in bed.

2. Interdiction of solid foods, milk, broths, raw foods, fruits, tea and alcohol. The diet should consist of tartaric or citric lemonade, carbonated beverages, Seltzer water, champagne and weak coffee.

3. Hot applications over the abdomen.

4. For the diarrhea: Lactic acid lemonade, laudanum, and albumin water. Enteroclysis with tannic acid—5 to 10 grams (75 to 150 grains) of tannic acid per liter of boiled water, with 30 to 50 grams (1 to 1½ ounces) of acacia.

5. As soon as improvement occurs, add to the diet, purées, pastes, then very fresh eggs and broiled or roasted meats.

II. **Established Cholera.**—One should act prudently but quickly.

1. Rest in bed.

2. Diet (see I). To prevent vomiting, give iced champagne diluted with water or very weak iced coffee.

3. Do not waste time in trying opium or the weaker antiseptics. Begin immediately with calomel or lactic acid (the two are not to be used in combination). If calomel is selected, acid lemonades (tartaric, citric, etc.) should be carefully avoided, though they may be combined with the lactic acid treatment.

4. From the start, without waiting for collapse and cyanosis, give warm baths (38° C.—100.4° F.) of ten minutes' duration, every three hours.

5. Enteroclysis: Enema of physiologic salt solution or of glucose solution. Copious subcutaneous injections of salt or glucose solution, 500 cubic centimeters (1 pint) twice in the twenty-four hours, to combat the dehydration. In the grave cases, copious intravenous injections of salt solution or glucose solution (1 or 2 liters in twenty-four hours).

[Rogers recommends for subcutaneous, intraperitoneal and intravenous injection a hypertonic solution consisting of sodium chloride, 120 grains (8 grams); calcium chloride, 4 grains (0.25 gram), and water, to make 1 pint (568 c.c.). The intravenous route is preferred, especially where the pulse is feeble or absent, and the initial dose in adults is 3 pints; this is to be repeated as often as indicated by the condition of the pulse and the amount of fluid lost by the vomiting and purging. Rogers also uses an alkaline saline solution consisting of sodium bicarbonate, 160 grains (10.7 grams); sodium chloride, 90 grains (6 grams), and water, to make 1 pint (568 c.c.). One pint of this alkaline solution is given first to every case requiring an intravenous injection, and the hypertonic solution then given through the same flask and cannula up to the full amount of fluid required. These

double injections are repeated as long as collapse or high specific gravity of the blood indicates further hypertonic injections, and the urine, if any is passed, is still acid.—Tr.]

6. For the vomiting: Ice, chloroform water, and gastric lavage with boiled water or a weak solution of lactic acid.

7. For the low blood-pressure: Adrenalin.

8. In the *algid stage*, vigorous rubs, continued patiently and persistently. External heat by means of hot-water bags and hot blankets.

9. For *adynamia*: Hypodermic injections of ether and of caffeine. Internally, a preparation of ammonium acetate with compound spirit of ether.

10. For *cramps*: Hot sand-bags or hot bricks along the extremities, and particularly, warm baths (38° C.—100.4° F.).

11. Oxygen inhalations.

Treatment During Convalescence.—The resumption of feeding should be supervised very closely. The patient should receive kephyr, ass's milk, meat juice, then eggs and white meats.

Obstinate dyspeptic disturbances and gastric intolerance are to be looked upon with apprehension.

In the event of constipation, a glycerin enema or suppository.

The patient should be kept in bed as long as possible.

DIPHTHERIA.

Antidiphtheritic serum therapy has singularly simplified the treatment of diphtheria; it is in itself practically a sufficient treatment.

Certain local and general measures may, however, be very useful as adjunct treatment.

More and more exceptionally, it may be necessary, in the event of threatening asphyxia, to resort to the more radical measures, intubation or tracheotomy.

In no transmissible disease are the prophylactic procedures to be gone into more minutely than in diphtheria.

I.—ANTIDIPHTHERITIC SERUM THERAPY.—Ségaré has formulated the following useful concrete rules to be observed in antidiphtheritic serum treatment.

1. Inject the antitoxin under the skin of the abdomen or thigh as soon as the diagnosis of diphtheria has been made. Inject it slowly.

2. Inject serum at once if diphtheria is suspected during an epidemic; if a suspicious throat condition is accompanied by a nasal discharge or a change in the patient's voice, or where a phlegmonous sore

throat becomes covered with a pseudo-membranous exudate: Under these circumstances do not wait for the result of the culture.

3. Inject the serum in sufficient doses. It is difficult to state the proper dosage in an absolutely definite manner. The course to be followed depends upon how long the condition has existed, the age of the patient (a relatively less important factor), the severity of the constitutional manifestations, the appearance of the throat, the intensity of the coryza, and the reaction in the lymphatics.

In diphtheritic sore throat of recent onset, not less than 2500 units should be given to a child of three years and not less than 5000 units to an adult; these are minimum amounts for a sore throat with pseudo-membranes of limited extent.

In malignant diphtheritic sore throat, whether malignant from the start or having gone several days without treatment, the foregoing amounts should be at least doubled.

4. On the succeeding days continue the use of the serum. In an ordinary pharyngeal case, be guided by the appearance of the throat after the first injection and by the stationary condition of the pseudo-membranes or their tendency to spread. Repeat the initial dose on the next day or after forty-eight hours. If indicated, give a third injection about the fifth day, generally administering one-half the doses previously given. Watch the patient during convalescence, even in apparently mild cases, and be ready to resume the serum treatment at the first indication of albuminuria, paralysis or any other manifestation of diphtheritic nature.

5. **Malignant diphtheria.**—After the large injection on the first day (about 5000 units in the youngest children, 7500 units in older children and 10,000 units in adults), the same amount should be repeated on the next day if the constitutional symptoms are still as threatening; the dose should be reduced by one-third if the condition of the heart, the pulse and the blood-pressure has not become worse and if the pseudo-membrane has failed to spread.

On the third or the fourth day, according to the result obtained and the age of the patient, reinject 5000 or 2500 units; continue with 2500 or 1250 units up to about the fifteenth day. Be careful not to discontinue the treatment if the heart-sounds are rapid or weak, if there is a tendency to embryocardia, if the blood-pressure is much lowered, if the albuminuria persists, or if the throat is not yet entirely clear.

In laryngeal diphtheria the same rules are to be followed as regards dosage.

After the fifteenth day there is advantage, in the malignant forms, in continuing small amounts of serum in order to forestall threatened paralysis and late heart complications. Always be sufficiently guarded as regards the prognosis, and as long as the disquieting symptoms persist, do not discontinue the serum, but give 625 to 1250 units every four to six days, sometimes up to the fifth or sixth week.

6. Always combine with the serum injections of a solution of strychnine and sparteine. Also use camphor in oil, adrenalin and dried suprarenals.

7. Do not be afraid of the serum and never allow yourself to be held back by the fear of anaphylaxis. The precaution should, however, be taken of inquiring from the family if the patient has received an injection of serum at some previous time.

8. If he has previously received serum, begin by giving an enema of 10 to 20 cubic centimeters of antitoxin, or better, give hypodermically 0.25 to 1 cubic centimeter of antitoxin in two or three injections one hour apart, and four hours later administer the therapeutic injection. At the same time give a solution of calcium chloride by the mouth.

9. In most instances, the patient will not have received serum previously. Bear in mind that serum symptoms, however frequent they may be, are relatively innocuous under these circumstances. Intensive serum treatment is one of the best means of avoiding such complications.

10. In brief, *in children* there are practically no contraindications to curative antidiphtheritic serum treatment (M. Ségard).

[In America, the tendency is to give a single sufficiently massive dose of antitoxin as early as possible in the disease rather than a series of doses, on the ground that the dose of antitoxin required if given early is less, and the effect greater, than when antitoxin is given later. A second dose is, as a rule, given only if, in spite of the initial large dose, the membrane is still spreading the next day and improvement of the general condition has not occurred.

According to S. S. Woody, of the Philadelphia Hospital for Contagious Diseases, cases with limited membrane, seen on the first day, should be given 10,000 units, or, if there is the least dyspnea, 15,000 units. Cases seen only on the second day should receive 15,000 or 20,000 units, and those seen later, 20,000 units or more. Cases of nasal diphtheria with membrane, discharge and toxemia should receive 20,000 units on the first day of the disease, or larger amounts if only seen later. Nasal cases diagnosed by culture only, with but slight moisture, should receive 10,000 units or more. Intramuscular,

rather than subcutaneous, injection of the serum, preferably at the junction of the upper and middle thirds of the thigh, antero-externally, is advised. Intravenous injection of a single sufficient dose of antitoxin is recommended by Park on account of the more immediate and satisfactory effects and the fact that only one-fourth as much of the antitoxin is required. The procedure is, however, more difficult than hypodermic injection, and a clear serum of high potency is needful in order to minimize the chances of a general reaction from the therapeutically inactive components of the serum. The single, usually sufficient dose is 3000 units for cases with tonsillar membrane, 5000 units for more extensive membranes, and larger amounts for late, severe cases.

Park notes that whereas subcutaneous injection requires two days to exert its full effect, in intravenous use the antitoxin passes out into the tissues immediately. In babies, the intravenous injection is given in the jugular vein; in older children, in a vein in the arm.—
Tr.]

II.—LOCAL TREATMENT OF DIPHTHERIA.—1. If the diphtheritic process is located on the skin, on the lips, etc., the affected area should be painted with tincture of iodine, or phenyl salicylate, thymol iodide, bismuth subgallate, etc., applied.

2. If the eyes are involved, free irrigations with 5 per cent. Labarraque's solution [*Liquor sodæ chlorinatæ*, U. S. P.] should be carried out.

3. If there is nasal diphtheria, the nasal cavities should be sprayed and irrigated every two or three hours with 0.5 per cent. phenol solution or 0.1 per cent. salicylic acid solution; or better, insufflations of dried, powdered antitoxin should be carried out (without the antiseptic spraying and irrigation).

4. In pharyngeal diphtheria, one may likewise either employ antiseptic lavage (salicylic acid solution, Labarraque's solution or phenol and sodium sulphurinate), avoiding irritant or caustic preparations, or resort to spraying with the dried powdered antitoxin or applications of a serum collutory; the patient may also be given an antitoxin tablet to suck every hour.

III.—GENERAL AND MEDICINAL TREATMENT.—See the earlier section on *General Treatment of the Infectious Diseases*.

IV.—TREATMENT OF COMPLICATIONS.

Albuminuria.—An exclusive milk diet; dry or wet cupping over the lumbar regions. Give further injections of antitoxin.

If there is *anuria*, free ingestion of fluids; copious colonic irrigations with cold water; injections of physiologic salt solution, or better, of glucose solution.

Bronchopneumonia.—See *General Treatment of the Infectious Diseases*.

Heart Weakness.—See *General Treatment of the Infectious Diseases*.

Hemorrhages (epistaxis, hematuria, intestinal hemorrhage, etc.).—These are prognostically unfavorable and there is little to be done for this complication: Acid drinks, ferric chloride, ergotin, adrenalin. Packing of the nose may be indicated. The main treatment for these malignant diphtheritic cases is massive serum therapy. [Blood transfusion by the indirect method.]

Paralysis.—The serum treatment, usually already discontinued when paralysis appears, should be resumed. From 1250 to 2500 units of antitoxin should be injected daily until the paralysis is recovered from.

At the same time strychnine, iron and arsenic should be prescribed and the paralyzed muscles treated with the galvanic and sometimes the faradic current.

Massage, stimulating rubs and sulphur or saline baths are useful adjunct measures.

The paralysis frequently interferes with the ingestion of food and sometimes it becomes necessary to use the esophageal tube.

The period of recovery should preferably be spent in the country or at the seashore.

TREATMENT OF LARYNGEAL DIPHTHERIA.

In addition to the general treatment applicable in other forms of diphtheria, this condition calls for special treatment on account of the obstruction offered to the passage of the air by the presence of the pseudo-membranes, irritation of the larynx, and spasm of the laryngeal muscles. *Tracheotomy* and *intubation* have been devised for the relief of such cases.

Before resorting to one of these procedures, however, even if there is difficulty in inspiration, the physician may attempt to combat asphyxia with medical procedures which are sometimes successful by facilitating expulsion of the membranes; valuable time is thus gained, during which the antitoxin, injected in massive dosage, is given the opportunity to act.

Spraying of boric acid solution directly on the throat with Lucas-Champonnière's apparatus, at hourly intervals.

Vaporizations.—In a pan filled with water and heated over a flame, boric acid solution may be poured, or, every hour, a teaspoonful of a 5 per cent. solution salicylic acid in alcohol.

The air in the room should be rendered so moist that all objects therein are wet.

Emetics.—Emetics may be used if the patient is not weak, at the very beginning of the condition; the results should not be too confidently counted on.

Many observers have advocated the giving of morphine injections, which, eliminating the spasm, sometimes obviate the need of intubation or tracheotomy.

At all events, if the inspiratory difficulty persists or increases in spite of these various measures, intubation of the larynx should not be too long delayed, as there is risk of the patient's becoming exhausted through the asphyxia.

Intubation of the Larynx.

Indications.—The only indication is *threatened asphyxia*, attested by crowing respiration, attacks of suffocation and inspiratory depression above and below the sternum. When the latter condition is continuous, there is imminent danger: The physician should be in readiness and not leave the patient. On the one hand, he should not operate too soon, while awaiting the action of the serum, but keeping the patient under close observation. On the other hand, he should not wait for cyanosis; anesthesia of the skin, etc.

Contraindications.—These are open to discussion, and not absolute; they make the outlook after intubation worse, but on the whole, the procedure is always necessary.

Toxic diphtheria (earthy pallor of the face, swelling of the lymph-glands in the neck, prostration, etc.).

Extensive bronchopneumonia, diphtheritic bronchitis, pronounced edema of the aryteno-epiglottic folds.

Concomitant measles.

Tracheotomy.—See Part II: *Tracheotomy*.

The indications and contraindications are the same as for intubation.

Whenever a choice between the two procedures is possible, *i.e.*, when the physician is familiar with intubation and continuous observation of the patient by a person trained in extubation and intubation is feasible, intubation should be preferred to tracheotomy, even in a case of croup in the final stage of asphyxia.

Tracheotomy remains indicated, then, only under the following circumstances: When the introduction of the tube makes the dyspnea worse or causes cessation of breathing, and where artificial respiration shows that the air is not passing through the tube that has been inserted and, consequently, that the false membrane has been forced upward.

V.—PROPHYLACTIC TREATMENT.—See *Infectious Diseases*.

Sources of infection: The pseudo-membranes.

Period of transmissibility: From the onset, often even during convalescence, and after recovery, for weeks or months, in diphtheria carriers.

Isolation: Should be strict. Duration regulated by the results of bacteriologic examinations of the buccopharyngeal and nasal secretions.

Prophylactic injection of serum.—From 625 to 1250 units of antitoxin, according to age, are to be injected into all contacts. The duration of the resulting immunity is from four to six weeks. [Not to be relied on beyond three weeks.—Tr.]

Lesné uses for preventive serotherapy a deproteinized serum prepared by the Institut Pasteur under the name of "purified diphtheria antitoxin"; with this preparation no symptoms of serum intoxication need be feared. The bottle containing 1000 units represents the prophylactic dose. For curative doses, bottles containing 4000, 5000, and 8000 units are supplied.

Toxin-antitoxin immunization.—This consists in subcutaneous injection of a slightly under-neutralized mixture of diphtheria toxin and antitoxin, which excites a prolonged active immunity in the recipient. The indication for such immunization is afforded by the *Schick test*, which is performed by injecting intracutaneously, in 0.2 cubic centimeters of saline solution, $\frac{1}{40}$ the minimum dose of diphtheria toxin which is fatal to a 250 gram guinea-pig, a positive reaction being recognized on the third or fourth day by a circumscribed area of redness and slight skin infiltration 1 to 2 centimeters in diameter, remaining for 7 to 14 or more days and followed by scaling and persistent brownish pigmentation. The Schick test is positive between the ages of 1 and 4 years in about 32 per cent. of normal children.

In toxin-antitoxin immunization, the dosage is usually 1 cubic centimeter, injected 3 times at intervals of one or two weeks. Such treatment causes about 85 per cent. of susceptible individuals to give a negative Schick test and become immune to diphtheria. The immunity develops only in one to six months after the injections, but in at least 90 per cent. of children it lasts for more than six years and probably for the remainder of life.—Tr.]

Many attempts have been made to obtain antidiphtheritic immunity.

Ramon published in *Annales de l'Institut Pasteur*, Dec., 1923, the results of his important researches. A diphtheria toxin which had completely lost its toxicity to animals under the action of heat and of formaldehyde was found capable, when injected into the body, of inducing the formation of antitoxin and of rendering the system im-

mune. This toxin, deprived of its toxic power, but still endowed with antigenic power, is known as diphtheria *anatoxin*.

In subjects who have received immunizing injections and giving a negative Schick test (the Schick test being none other than the intradermal reaction to diphtheria toxin), the increase of the already existing antitoxic power is manifest.

In those immunized but with positive Schick test, this test is observed to become negative.

Roubinowitch, Loiseau, and Laffaille propose the following procedure: Initial injection of 0.5 cubic centimeter of anatoxin and application of a Schick test twenty days after the injection. If the test remains positive, even slightly, a second injection of 1 cubic centimeter of anatoxin and another test after the lapse of twenty days are carried out.

J. Renault and P. Lévy use a freshly prepared mixture of fresh toxin and of antitoxic serum of the Institut Pasteur. The mixture is hyperneutralized. Three injections at weekly intervals are administered. Antidiphtheritic immunization is thus obtained, according to these observers, in a manner which is simple, effective, and free from danger.

The Institut Pasteur recommends an initial subcutaneous injection of 0.5 cubic centimeter of anatoxin followed, after two or three weeks, by a second injection of 1 cubic centimeter. To be certain of obtaining an immunity of 98 to 100 per cent. a third injection of anatoxin is recommended (in children, 1 cubic centimeter; in adults, 1.5 cubic centimeters), to be given fifteen to twenty days after the second injection.

DYSENTERY.*

BACILLARY DYSENTERY.—Bacillary dysentery may be due either to the bacillus of Shiga, which produces true dysentery, or to the bacilli of Flexner, Hiss and Strong.

The treatment, however, is similar in these different varieties.

Prophylaxis.

- (a) *Water.*—To be filtered or chemically disinfected.
- (b) *Exposure of the abdomen to cold.*—A flannel belt should be worn.
- (c) *Causes of irritation of the digestive tract.*—Preserved meats and unripe fruits to be avoided.

* See also section on *Diarrhea* in Part III.

(d) *Fatigue, overwork*.—Likewise to be avoided.

(e) *Carriers of bacilli or amebæ*.—Bacteriologic examination of the stools of suspects is required.

(f) *Disinfection of the stools*.—Obviously very important.

The *preventive treatment* of bacillary dysentery consists in the subcutaneous injection of 10 cubic centimeters of an immune serum, such as that of Vaillard and Dopfer.

The immunity persists only for about twelve days. Therefore, during epidemics, the injections should be repeated.

Specific Curative Treatment.—A. **Serum Treatment.**—The serum to be used may be selected in accordance with the bacteriologic indications. There are available serums against the Shiga bacillus and the Flexner bacillus, as well as polyvalent serums. For practical purposes, the polyvalent serum may be injected first, or better, the anti-Shiga serum.

The first injection should be made as soon as possible after the onset of the disease.

Average cases (15 to 30 stools a day): Injection of 20 cubic centimeters of serum (in children, 10 cubic centimeters). To be repeated twenty-four hours later. Sometimes a third injection is required.

Severe cases (30 to 60 stools a day): Three injections of 20 cubic centimeters each (in children, 10 cubic centimeters), twenty-four hours apart.

Grave cases (60 to 100 stools): Initial injection of 40 to 60 cubic centimeters (in children, 20 to 30 cubic centimeters). Later injections in descending amounts, as long as the frequent mucoid stools continue.

Very grave cases (100 to 150 stools): Injection of 80 to 100 cubic centimeters within twenty-four hours (in children, 40 to 50 cubic centimeters) in two doses, especially when the serum treatment has been started late. The injections should be kept up twice daily, but in descending amounts, until the number of stools has fallen to 20.

The therapeutic effects of the serum are exerted rapidly: In a few hours there is manifest relief and reduction in the frequency of the stools. Average cases yield in two or three days.

B. Vaccine Treatment.—Vaccine treatment may be employed in dysentery either in the cases in which serum treatment is not feasible; in the chronic cases, in which the serum treatment has become ineffective, or in the acute cases due to organisms other than Shiga's bacillus.

Both stock vaccines and, preferably, autogenous vaccines have been used.

This procedure is still under investigation.

Medicinal Treatment.

Calomel in fractional doses for the first two or three days, *e.g.*, 0.025 gram ($\frac{3}{8}$ grain) every hour for twelve hours in the daytime. On the fourth day, bismuth subnitrate, 0.3 gram (5 grains) every hour for twelve hours, is substituted for the calomel.

Sodium sulphate in fractional doses: 2 to 4 grams ($\frac{1}{2}$ to 1 dram) every hour for twelve hours in the daytime, until the stools are improved; then 5 to 10 grams (75 to 150 grains) a day.

Castor oil, one tablespoonful in whisky, with or without tincture of opium (a few drops). A few hours later, the astringents are begun: Bismuth subsalicylate and phenyl salicylate; 0.25 gram (4 grain) capsules every two or four hours.

Symptomatic Treatment.—See *General Treatment of the Infectious Diseases*.

Dietetic Treatment.—*Rest in bed* for about three weeks—the time required for healing of the intestinal lesions.

Restriction to fluids on the first two days. Then, milk with addition of Vichy water or lime water: 1 to $1\frac{1}{2}$ liters at first.

Often the milk is not well borne. Vegetable broth should then be prescribed.

When improvement is seen, light gruels may be given, then boiled rice, articles prepared with flour, then meat juice, meat purée and egg yolks. When the stools have returned to normal, white meats and lean fish may be allowed.

Treatment of Rectal Lesions.—Rectal lesions (catarrhal or ulcerative proctitis, etc.) may be considered practically constant.

(a) *Enemas* of:

Hydrogen peroxide solution, 15 per cent.

Sodium bicarbonate solution, 0.5 per cent.

Magnesium chloride solution, 0.15 per cent.

Collargol solution, 0.5 per cent.

Silver nitrate solution, 0.1 per cent.

Or formulated benzol solution: Benzol, 4.5 cubic centimeters (70 minims), well shaken up with 150 cubic centimeters (5 fluidounces) of water, to which are then added 5 drops of 40 per cent. formaldehyde solution.

(b) *Suppositories* containing ichthyol or collargol, with addition of extract of opium and of belladonna.

(c) *Direct applications*, through the proctoscope, of 1 per cent. silver nitrate solution, 2 per cent. collargol, or:

R. Bismuthi subgallatis 10 grams (3iiss);
 Petrolati 20 grams (3v).

M. Sig.: Apply with a long wick, to be allowed to remain for twenty-four hours.

* * *

AMEBIC DYSENTERY.—Prophylaxis.—The prophylaxis is similar to that of bacillary dysentery.

Specific Medicinal Treatment.—Three drugs may be regarded as specifics in amebic dysentery, *vis.*, *emetine*, the double *iodide of emetine and bismuth* and *neoarsphenamin*. These agents may be administered either by the mouth or by the rectum. Emetine and neoarsphenamin may also be administered by the hypodermic or intravenous routes.

Following is the treatment formulated by Ravaut:

1. Intravenous or Hypodermic Routes.—Treatment by these routes is that of choice in acute attacks of dysentery with mucus and blood in the stools and in recent liver complications of the disease.

A series of ten intravenous injections of 0.3 gram of neoarsphenamin is given at four-day intervals (the dose to be finally increased up to 0.9 gram).

On the three days following injections Nos. 1, 2, 3, 7, 8 and 9, a daily hypodermic injection of 0.04, 0.06 or 0.08 gram ($\frac{2}{3}$, 1 or $1\frac{1}{3}$ grains) of emetine is given.

In the subacute forms of amebiasis, if the foregoing treatment proves ineffective, the oral or rectal routes of administration must be resorted to.

2. Oral Route.—This in the majority of instances is the only procedure that will bring about disappearance of the cysts in the chronic cases.

(a) *Emetine bismuth iodide.*—Tablets of 0.05 gram ($\frac{3}{4}$ grain) of this compound are given in the dosage of one to three tablets a day; or, keratin-coated pills each containing 0.06 gram (1 grain) may be given to the number of three a day with the meals.

This treatment is kept up for ten or twelve days.

The heart should be supported during this period.

The drug often causes diarrhea, which should be allowed to go on unchecked, as well as nausea, vomiting, depression and loss of appetite. It is much better borne when the patient's general condition has improved.

(b) *Tablets of neoarsphenamin* (Billon), each containing 0.1 gram. One or two tablets are to be taken daily for ten or twelve days.

(c) *Powdered charcoal* mixed with *bismuth subnitrate* and *powdered ipecacuanha*, in alternation with the neoarsphenamin tablets.

These treatments of twelve to twenty days' duration should be alternated and continued patiently for several months, with intermissions varying in duration with the individual case.

3. Rectal Route.—*Enemas of neoarsphenamin*, 0.15 to 0.3 gram in 50 cubic centimeters of water. Add 5 drops of laudanum.

Dietetic Treatment.—In the acute attacks, the diet already described for bacillary dysentery should be employed.

In the subacute forms the patient should abstain from milk, eggs and raw foods. The diet should consist of vegetable broth, purées, pastes and boiled rice. In the chronic forms the patient should not be placed on too stringent a diet.

Adjunct Medicinal Treatment.—*Ipecacuanha* in purgative dosage: 4 to 8 grams (1 to 2 drams) of ipecac, freshly broken up or powdered, to be boiled for five minutes. This dose is to be taken daily.

Ipecac may also be given by the "*Brazilian method*."

Four to 8 grams of ipecac, freshly broken up or powdered, are macerated for twenty-four hours in 250 to 300 cubic centimeters (8 to 10 fluidounces) of water. The supernatant fluid is decanted and 22½ cubic centimeters (6 fluidrams) of syrup of opium (0.4 per cent. of opium) added. This constitutes the Brazilian preparation No. 1, which is taken in hourly tablespoonful doses. Over the same powder are poured 250 to 300 cubic centimeters of boiling water and an infusion thus made. This constitutes Brazilian preparation No. 2, which is ingested in the same manner. On the third day, the same powder is again boiled in 250 to 300 cubic centimeters of water, constituting a decoction, No. 3, which is taken similarly. This method of treatment is effectual.

Castor oil, to be taken on three consecutive days: First day, 35 to 40 cubic centimeters (9 or 10 fluidrams); second day, 25 to 30 cubic centimeters (7 or 8 fluidrams); third day, 15 to 20 cubic centimeters (4 or 5 fluidrams).

Sodium sulphate, 2 to 4 grams (½ to 1 dram) every hour in the daytime for three days, then in smaller doses farther apart.

Calomel, either in massive dosage, such as 1 to 1.5 grams (15 to 22½ grains), or in fractional doses—0.05 gram (¾ grain) in ten powders—for several days.

Segond's pills:

R. <i>Ipecacuanhæ</i>	0.4 gram (gr. vj);
Hydrargyri chloridi mitis	0.2 gram (gr. iij);
Extracti opii	0.05 gram (gr. ¾);
Syrupi frangulæ	0.05 c.c. (m. j).
Ft. pil. No. vi.	

The six pills are to be taken in twenty-four hours, and may be renewed, if required, for three or four days. These pills are especially active in the chronic cases.

Kho-sam (*Brucea antidysenterica*). The almond-like portion of the seed is used. Five to ten tablets a day are taken.

Enemas, either emollient, with opiates; or astringent, *e.g.*, tannic acid (2 to 4 grams— $\frac{1}{2}$ to 1 dram), krameria (2 to 10 grams— $\frac{1}{2}$ to $2\frac{1}{2}$ drams), etc.; or stimulating, *e.g.*, silver nitrate (0.05 to 0.15 gram— $\frac{3}{4}$ to $2\frac{1}{2}$ grains—in 250 cubic centimeters—8 fluidounces—of distilled water); Labarraque's solution (10 cubic centimeters— $2\frac{1}{2}$ fluidrams—in 1 liter of water), or methylene blue (0.05 gram— $\frac{3}{4}$ grain).

Direct applications.—See *Bacillary Dysentery*.

Treatment of Combined Forms.—The condition may be combined with bacillary dysentery. In this event anti-Shiga serum should be injected.

Combination of the dysenteric ameba with other parasites produces a condition which is serious by reason of its persistency.

Cercomonas or *Trichomonas*: Capsules of turpentine and enemas of silver nitrate, or better, protargol.

Lambli (*Giardia*): Turpentine, sodium sulphate, thymol, male fern, arsenic, and sulphur intermittently for a prolonged period.

Trichocephalus or *Ascaris*: Male fern or thymol.

Symptomatic Treatment.—See *General Treatment of the Infectious Diseases*.

For the anal pains and rectal tenesmus: Cocaine, belladonna or morphine in an ointment or in suppositories or enemas.

In some dragging forms of amebic dysentery, the general deterioration of the patient is often the result of a deep seated impairment of the digestive glands, revealed by examination of the stools. In these cases pancreatic and hepatic organotherapy, etc., proves serviceable.

Treatment of Complications.—In *abscess of the liver* of small size and recent advent, retrocession may be brought about by means of injections of emetine directly into the abscess and by the specific treatment already described.

If the abscess is large, operation is indicated. Before the operation, however, it is well to administer the usual series of injections of emetine and neoarsphenamin. Another series of injections is begun a few days after the operation.

For the treatment of intestinal hemorrhage, see Part III: *Intestinal Hemorrhage*.

Treatment of the Sequelæ of Dysentery.

Watering Places.—The colon, and particularly the rectum, often remain sensitive and irritable following dysentery. Under these circumstances a stay at a watering resort may be of advantage, either to promote repair of the lesions of the mucosa or to relieve pain.

Anemia of Dysenteric Cases.—Pounded raw meat or meat juice should be tried. Lentils should be recommended, as they contain iron.

Tricalcium phosphate or calcium hypophosphite may be ordered taken by the mouth, together with saline hypodermoclysis and intramuscular injections of phosphorized oil (1:1000), 1 to 2 cubic centimeters (15 to 30 minims) at a dose.

ENCEPHALITIS LETHARGICA.

[κεφαλή, *head*; λήθαργος,
somnolent.]

BY ANDRÉ LUTIER, M.D.

Up to the present time no specific medication for this disorder has been found. Treatments suggested are many. We shall review the principal procedures which have been used with some success.

Prophylactic Treatment.—Isolation of the patient is futile in view of the long duration of the disease. The possibility of transmission from convalescents persists for an uncertain period of time. Antisepsis of the nasopharynx, the portal of entry of the virus, should be practised by the usual measures.

Curative Treatment.—**Methenamine** (urotropin).—This is the remedy which is the most trustworthy in its results. Netter prefers to give it by the mouth. It is also injected intravenously (1.5 to 2 grams—23 to 30 grains—daily).

In acute cases intraspinal injections of 4 to 6 cubic centimeters (60 to 90 minims) of a 1 per cent. solution are given at intervals of two to six days. Although in some cases the results have been favorable, severe reactions (vomiting) have at times been produced.

Sodium cacodylate in massive doses, injected intramuscularly or intravenously (0.5 to 1 gram—7½ to 15 grains—daily), has at times been highly successful; often these injections may be continued in courses of 12 to 15 consecutive days, separated by a few days' rest.

Hectin has also been used in intramuscular injections of 0.2 gram (3 grains) in courses of ten to twenty daily injections.

Bismuth.—L. Fournier has recommended injections of quiniobismuth. Along with a few notable successes, many failures have been witnessed.

Sodium salicylate in intravenous injections. A 5 or 10 per cent. solution is used. One may inject on the first day 1 gram (15 grains) of salicylate (20 cubic centimeters—5 fluidrams—of a 5 per cent. solution); on the second day, 2 grams (30 grains); on the third day, 3 grams (45 grains). Some inject up to 4 or 5 grams (60 or 75 grains) in twenty-four hours, in three or four injections.

Administration by the digestive route (6 to 8 grams—90 to 120 grains—a day) may also be employed.

At times the results are excellent, but they are inconstant.

Mercury.—Mercurial inunctions, up to 5 grams (75 grains) a day, or injections of mercury salicylate.

In acute cases rapid improvement has sometimes been obtained. In chronic cases results are *nil* or the medication even harmful.

Colloidal Metals.—Mainly used in this connection are colloidal gold intravenously and colloidal iodine intramuscularly.

Adrenalin is useful in cardiorespiratory complications of bulbar origin (dyspnea, tachycardia) and in asthenia; 3 or 4 drops should be given every three hours, or subcutaneous injections practised.

Pilocarpus.—To promote elimination of the virus through the salivary tract (Netter). An infusion of 2 to 3 grams (30 to 45 grains) of the drug in 200 cubic centimeters (6 $\frac{2}{3}$ fluidounces) of water may be given, or else pilocarpine hydrochloride, 0.01 to 0.03 gram ($\frac{1}{8}$ to $\frac{1}{2}$ grain) in a liquid preparation, in fractional doses.

Adrenalin should be given concurrently to obviate depression.

Fixation abscess, to be instituted as soon as possible. Yet, Netter has reported it as effective several months after the onset. He recommends repetition of it, if need be, every two or three months.

Lumbar puncture and *immediate subcutaneous reinjection of the cerebrospinal fluid (3 to 10 cubic centimeters) (autoserotherapy)*; this is generally ineffective, as is likewise intraspinal injection of the patient's own serum. *Intraspinal injections of cascín, horse serum, and anti-meningococcic serum* have also been employed.

These measures may be tried in acute cases; they act, on the whole, by exciting a meningeal inflammatory reaction and influx of leukocytes which seems to help in the defense of the nervous centers.

Attempts at **specific serotherapy** have been made: E. Ć. Rosenow has isolated a particular variety of streptococci from the infected tonsils, teeth and nasopharynx of patients with encephalitis. With this streptococcus he was able to obtain a serum which, injected into patients, gave doubtful results.

Intraspinal injections of the serum of convalescents (which, however, may be dangerous) have also been tried, as have likewise intra-

spinal or intramuscular injections of Levaditi's virus vaccine, with which some interesting, but not conclusive, results have been obtained, and which must be used cautiously to avoid severe reactions.

In the *myoclonic, choreic forms*, etc., and in the *tremor*, injections of atropine (0.001 to 0.002 gram— $\frac{1}{65}$ to $\frac{1}{32}$ grain) or coniine hydrobromide (0.001 to 0.003 gram— $\frac{1}{65}$ to $\frac{1}{22}$ grain—two or three times a week) may be employed.

In the *Parkinsonian syndrome* and *tremor*, there have been recommended subcutaneous injections of atropine or scopolamine hydrochloride (beginning with 0.00025 gram— $\frac{1}{260}$ grain—and increasing gradually to 0.00075 gram— $\frac{1}{87}$ grain) have been recommended. Dryness of the mouth and headache call for suspension of the remedy for a few days. The effect is only temporary. Guillain has recommended tincture of arnica (2 to 3 cubic centimeters—32 to 48 minims).

Lastly, according to the case, there should be employed: Warm baths, light baths, faradization, spinal galvanism, the high frequency effluve, X-ray therapy, and motor reeducation.

ERYSIPELAS.

Prophylaxis.—Direct transmission, except during an epidemic, is uncommon. It is advisable, however, to isolate the patients and maintain asepsis of the face, throat, neck, eyes, etc.

In recurring erysipelas, attending menstruation or not, hygienic precautions in connection with the mucous membranes at these periods should, in particular, be recommended.

General Treatment.—The diet, stimulant medication, anodyne medication, etc., are in no wise peculiar in erysipelas (see *General Treatment of the Infectious Diseases*). In serious cases there should be no hesitation in giving intravenous injections of collargol, electrargol or electrocuprol, or of mercury cyanide.

Specific Serum and Vaccine Treatment.—Injection of large doses of antistreptococcus serum is asserted to have sometimes yielded most encouraging results. Fifty cubic centimeters of the serum may be injected hypodermically once a day in cases of average severity and twice daily in serious cases, for from two to four or even five days. The efficacy of this procedure is questioned by many writers.

Vaccine treatment is likewise very inconstant in its results.

Local Treatment.—It seems of advantage, from the start, to recall a few fundamental features, well summarized by Brelet as follows:

"Every good treatise on treatment contains at least five or six pages on the treatment of erysipelas of the face, and to add further

to the difficulty of selection, scarcely a year passes without some new therapeutic measure being advocated for this still common disorder.

"Erysipelas being primarily a local disease, an infectious dermatitis associated with streptococci, it is well first of all to institute local treatment. But, while he carries out vigorous treatment, the physician should take care not to use topical remedies and antiseptics that are too violent in their action, since it would be unfortunate to superimpose upon the streptococcic dermatitis a dermatitis medicamentosa, and this is what happens with some of the plans of treatment frequently recommended."

Following are the principal topical remedies employed in the local treatment:

1. *Application of compresses dipped in boiled water as hot as can be borne* (or an infusion of elder flowers).—This is one of the best procedures available to allay the pain.

2. *Hot sprays of boiled water or of 1:1000 mercury bichloride solution*.—This is a very good treatment, which brings the patient much relief.

A steam atomizer is used, and held at a distance of about 50 centimeters (20 inches) from the affected area. The jet is directed at this area and at the surrounding healthy tissues.

The eyes are shielded with cotton. The mouth is kept closed. The rest of the body is protected by rubber cloth. If the scalp is involved, the hair is cut off.

The spraying should be continued for half an hour.

It is repeated every three hours, day and night, for the first day, and sometimes also on the second day. As soon as improvement is seen, one or two of the spray treatments are discontinued. Beginning with the fourth day, the spraying is done every six hours, and later every twelve hours.

During the period of spraying with mercury bichloride it is well to keep the patient on a milk diet and to examine the urine every day.

3. Painting twice daily with a saturated solution of potassium permanganate, and covering with *dry* gauze.

4. Painting the circumference of the area with a weak solution of picric acid, 1:1000, with 15 cubic centimeters ($\frac{1}{2}$ fluidounce) of alcohol. A dry cotton dressing is then applied. The procedure is repeated every two hours for three days.

5. Painting with glycerin or 20 per cent. copper sulphate solution.

6. Painting with 5 per cent. methylene blue solution.

7. Ichthyol appears to be the most serviceable topical remedy:

(a) Traumaticin (5 per cent. gutta-percha in chloroform) and ichthyol, equal parts, to be painted on the periphery of the erysipelatous patch several times a day.

(b) Ichthyol and boiled water, equal parts, to be painted over freely once or twice a day. No dressing is used. The ichthyol dries and forms a thick crust over the affected area.

(c) Ichthyol ointment, much less active:

℞ Ichthyolis	2 grams (℥ss);
Zinci oxidi,	
Adipis lanæ hydrosi	8 grams (℥ij);
Petrolati	12 grams (℥iij).
Ft. unguentum.	

If the nose is infected in the vicinity of the patch, the nasal passages should be irrigated with warm salt solution and the following ointment then introduced in the nostrils:

℞ Ichthyolis	1 gram (gr. xv);
Petrolati	30 grams (℥j).
Ft. unguentum.	

In the inflamed forms, associated with oozing and suppuration, moist dressings of a 5 per cent. solution of ichthyol should be applied for twenty-four or forty-eight hours. Later, applications of ichthyol diluted one-half. Finally, when the inflammatory condition has been allayed, the ichthyol ointment.

8. Tincture of iodine is used in Italy. The zone of invasion and the affected area as a whole are painted over with tincture of iodine on sterile cotton pledgets; a sterile cotton dressing is then applied. The procedure is repeated, always lightly, five or six times a day. A fresh tincture of iodine should be used.

9. After the acute stage is past, if redness persists, a creamy preparation of hydrogen peroxide should be used:

℞ Liquoris hydrogenii dioxidi	20 c.c. (f5v);
Zinci oxidi,	
Petrolati	10 grams (℥iiss);
Amyli	5 grams (gr. lxxv).—M.

Where there are dilated vessels, the following ointment may be employed:

℞ Liquoris epinephrinæ hydrochloridi	gtt. xxx;
Zinci oxidi,	
Adipis lanæ hydrosi	8 grams (℥ij);
Petrolati	12 grams (℥iij).
Ft. unguentum.	

Treatment During Convalescence.—Tonic measures should be prescribed.

The patient should not be allowed to go out until desquamation is completely ended. Frequently, a relapse occurs when the patient exposes himself too soon to the open air and dust.

INFLUENZA.

Prophylaxis.—*Sources of infection:* Secretions and discharges from the mouth, pharynx, eyes and nasal cavities.

Period of transmissibility: From the onset, through the acute stage.

Isolation: To be instituted as soon as possible.

Disinfection: When the disease has been complicated by bronchopneumonia, disinfection is advisable.

The influenza epidemic of 1918-19 demonstrated the utility of isolation of the patients; of disinfection of all transmitting agencies (sputum, stools of diarrhetic patients, etc.), and of protective measures for the attending personnel, *e.g.*, the wearing of a mask made of several thicknesses of gauze, similar to that worn by surgeons in operating, and to be fastened in front of the nose and mouth when in the vicinity of the patient.

Other preventive measures include certain procedures relating to the mouth and nose (gargling, antiseptic instillations in the nasal cavities) and the administration of a large dose (0.8 to 1 gram—12 to 15 grains) of quinine sulphate.

Vaccine Treatment.—See Part I: *Vaccine Therapy*.

Medicinal Treatment of Simple Influenza.—*Quinine sulphate.*—This is considered by some almost a specific for influenza in doses of 0.5 to 0.8 gram ($7\frac{1}{2}$ to 12 grains) a day.

Combination of it with *antipyrin* presents certain advantages, *viz.*, rapid relief from the muscle pains, headache, pain about the eyes, etc.

As antipyrin exerts a depressant action on the nervous system and blood-pressure, an irritant action on the skin and an inhibiting action on the kidneys, it may be replaced by *acetylsalicylic acid*, with 0.02 gram ($\frac{1}{3}$ grain) of caffeine as a corrective.

Guaiacol cacodylate.—Regarded as a specific by some physicians, especially during the first stage of the disease.

The contents of one of the following ampules is to be injected into the gluteal region morning and evening:

R. Guaiacolis cacodylatis	0.05	gram (gr. $\frac{3}{4}$);
Strychninæ sulphatis	0.001	gram (gr. $\frac{1}{60}$);
Camphoræ	0.25	gram (gr. iv);
Olei olivæ (loti alcohole)	5	c.c. (℥ lxxx).—M.
		(NIGAY.)

For irritation of the larynx and trachea: Dover's powder, codeine; syrup of ether (2 per cent.), bromides; mustard poultices over the chest; careful disinfection of the nose and pharynx (gargling and nasal instillations of gomenol in oil).

For reduced urinary output: Free ingestion of fluids, diuretic decoctions (uva ursi, cherry stems, etc.) and diuretic mineral waters. Also cold water enemas.

For constipation: Magnesia, rhubarb.

For restlessness and sleeplessness: Decoctions of orange leaves or linden flowers, codeine, valerian, ether or sulphonal.

For fever: If the temperature continues at 40° C. (104° F.) on the third day, tepid baths (32 to 34° C.—89.6 to 93.2° F.) of fifteen to twenty minutes' duration, once or twice in twenty-four hours.

For weakness: Stimulating alcoholic fluids, ammonium acetate or chloride, tincture of cinnamon, ether, adrenalin or dried suprarenals, hypodermic injections of strychnine or of camphor and ether in oil.

Treatment of the Pulmonary Type of Influenza.—For thoracic distress and cough: Cough sedative decoctions, ether or opiates.

For attacks of pulmonary congestion: Mustard poultices, moist wrappings about the chest, cold or hot, with or without mustard. Dry and wet cupping. Warm baths (40° C.—104° F.).

For the expectoration: Potassium antimonate, and later, when the acute stage is past, the balsams, such as terpin hydrate.

Treatment of the Gastro-intestinal Type.—Cholagogues and intestinal antiseptics such as the naphthols, betanaphthol salicylate, etc., may be given.

In this type, there are frequently observed cardiac intermittences, palpitations, dizziness and slow pulse. Accordingly, antispasmodics should be prescribed: Valerian, ether, compound spirit of ether, anisated tincture of ammonia, and small doses of caffeine (0.15 to 0.3 gram—2½ to 5 grains—a day).

In the dragging, pseudo-typhoid forms: Tepid baths (32 to 34° C.—89.6 to 93.2° F.).

Treatment of the Nervous Type.—For nervous irritability: Valerian, bromides, sulphonal.

For nervous depression: Alcohol, ether, cinchona, kola.

For the brain symptoms (headache, delirium, etc.): Ice applications to the head; tepid tub baths.

Dietetic Treatment.—As influenza is a depressing disease, the patients should be fed as well as is possible. Frequently, only a liquid diet, consisting mainly of milk and broths, is well borne during the febrile stage. As soon as feasible, however, a more substantial diet should be given: Soups, purées, eggs, pastes, fowl, fish and fruits.

Treatment of Complications and Treatment during Convalescence.—

The treatment indicated is the same as in infectious diseases in general.

Complications Relating to the Pleuræ and Lungs (congestion and infiltration of the lower lobes, bronchopneumonia, lobar or pseudo-lobar pneumonia).—See the sections on *Pneumonia*, *Bronchopneumonia*, *Bronchial Paralysis* and *Bronchitis*.

Hemorrhagic Complications.—See the sections on *Epistaxis*, *Hematuria* and *Hemoptysis*.

MALARIA.

Prophylaxis.—The *preventive treatment* consists in the administration of quinine salts to healthy persons exposed to the infection: 0.2 to 0.25 gram (3 or 4 grains) of quinine hydrochloride daily during the danger season, or 0.4 to 0.5 gram (6 to 8 grains) on alternate days.

The barrier erected against malaria with quinine is, however, insufficient unless mechanical protection is combined with it: The use of *mosquito netting* remains indispensable.

Specific Medicinal Treatment.

Quinine is truly the specific remedy for malaria. It possesses a powerful action on the young schizonts of *Plasmodium vivax* and of *Plasmodium malariae*. Where these parasites are older, the effect of the drug is less rapid. It even appears to be devoid of action on the sporocytes or divisional forms of the schizont, which continue the life cycle until they are ready for the discharge of the sporozoites. The gametes are still more resistant. The *Plasmodium præcox* of tropical malaria is more refractory to the action of quinine.

The treatment of malaria with quinine would appear to be rather complicated, judging from the various plans of treatment that have been devised, differing both as to the doses of quinine to be prescribed, the time the drug is to be taken with reference to the expected attack, the duration of treatment required, etc. In reality, increasing experience has tended rather to codify and simplify the treatment. The latter is governed by the following principles:

1. Quinine should be prescribed in all the manifestations of malaria, including obstinate neuralgias, etc.

2. *The type of fever present does not require any material modification in the plan of treatment.*

3. *The time at which the quinine is taken with reference to the time of the attack is of no importance.*

It is recognized, to be sure, that the quinine is particularly active against the merozoites set free by the bursting of the rosettes, this bursting being coincident with the beginning of the febrile paroxysm; there is, therefore, certainly advantage in that the quinine be in the blood at this definite time. But on account of the multiplicity of infecting mosquito-bites, malarial subjects harbor several generations of plasmodia which follow their cycles simultaneously in the body. Therefore, at any given time there are present in the blood parasites of very different ages.

4. *Whatever be the mode of introduction of the remedy, its efficacy is the same; the same doses are required.* The intravenous route is merely more rapid in action, and preferable in pernicious malarial attacks.

5. *The amount of quinine taken should be not less than 2 grams (30 grains) a day, in two doses of 1 gram each, morning and evening.*

This treatment should be kept up until there is subsidence of the fever.

(a) **Treatment of Simple Intermittent Fevers.**

Two grams of quinine (generally the basic hydrochloride) are to be given in two doses of 1 gram each, morning and evening, in cachets, tablets or solution (see Part I: *Quinine*).

The drug should be taken on three consecutive days in each week for ten weeks.

On the other days of the week, 2 to 3 cubic centimeters (30 to 45 minims) of a 10 per cent. solution of sodium methylarsenate are to be injected hypodermically.

Jeanselme recommends the giving of a weekly dose of 3 grams (45 grains) of quinine for six months to one year. At all events, each year, during the months in which recurrence of malaria is most frequent, it will be well to take 2 grams (30 grains) of quinine a day on two consecutive days in each week.

(b) **Modifications of the Treatment in the Different Forms of Malaria.**—*Remittent Fever.*—Quinine should be given in large doses, *viz.*, 2 to 3 grams a day, and if need be, administered by injection.

Severe Cases.—Subcutaneous or intramuscular injections of quinine (1.5 to 2 grams—23 to 30 grains—a day in two doses) should be given.

Pernicious Malarial Attacks.—An immediate intravenous injection of quinine must be given; any delay may be responsible for death. If the patient is not sufficiently improved in ten or fifteen minutes, *e.g.*, if coma persists, a second injection should be given, and a little later, if required, a third intravenous injection.

Bilious Hemoglobinuric Fever.—Quinine should be prescribed with considerable caution, in small, fractional doses.

Malarial Cachexia.—Quinine must be given, but in smaller dosage than usual. Extract of cinchona yields very good results, and should be continued long after the cessation of the paroxysms.

Drawbacks of Quinine Medication.—See Part I: *Quinine*.

Adjunct Measures.—In *algid attacks*: Ether in a syrup or by hypodermic injection, ammonium acetate, and tea with addition of alcohol; stimulating rubs.

In *comatose attacks*: Ice applications to the head; leeches over the mastoids; counterirritation of the extremities.

In *delirious attacks*: Chloral hydrate.

For *vomiting*: Champagne and ice. If necessary, an injection of morphine in the epigastric region.

For *gastric irritability with coated tongue and sordes*: Saline purgation.

In *bilious fever*: Ipecacuanha and calomel.

In *bilious hemoglobinuric fever*: Calcium chloride.

General Treatment.—All factors tending to weaken the patient interfere with recovery from malaria. Accordingly, a quiet mode of life should be recommended, without fatigue, with good food, and a stay in the country.

Change of climate exerts a beneficial reconstituent influence, life in the tropics tending toward the production of anemia.

A *thermal cure* at Vichy is frequently of much service, particularly where there is enlargement of the liver and spleen.

Hydrotherapy often gives very good results, especially in malarial cachexia, in the form of short, tepid douches to begin with, and later cold rain douches. To obviate the possibility of causing a relapse, direct douching of the spleen should be avoided and small doses of quinine prescribed.

For the anemia and loss of weight, malarial subjects should be given courses of arsenic, iron, tonics, the various cinchona preparations and meat juice.

Splenic enlargement should be treated with revulsive measures, especially when there is pain, pointing to the presence of some degree of perisplenitis.

The wearing of an abdominal belt should be advised, to keep the spleen from wandering and making traction on the diaphragm.

Lastly, X-ray treatment brings about recovery, sometimes rapid, from the enlargement of the spleen and liver.

As for splenectomy, it is considered indicated only if the condition of the spleen should be the cause of serious symptoms, which is exceptional.

MEASLES.

Prophylaxis.—*Sources of infection:* Secretions and discharges from the eyes, nose and mouth.

Period of transmissibility: Before, during and after the eruption.

Isolation: Sixteen days.

Serum Prophylaxis of Measles.—*Injection of Convalescents' Serum.*
—Serum from a convalescent has prophylactic power against measles.

According to C. Nicolle and E. Conseil (*Acad. des Sciences*, July 1, 1923), convalescents' serum should be collected between the sixth and the tenth days after defervescence. This serum, kept in a refrigerator, retains its prophylactic properties for at least two years. The immunity procured by this procedure can hardly be expected to exceed a few weeks. In order to obtain a more prolonged immunity, the observers mentioned advise recourse to "serovaccination," consisting of the inoculation in succession of 10 cubic centimeters of convalescents' serum and, twenty-four hours later, of 1 cubic centimeter of the blood of a measles patient. Such serovaccination can, of course, be carried out only before the subject has been infected with the disease.

Serum Prevention.—If the subject is given, after being infected, during the first five days, injections of convalescents' serum in amounts of 3 cubic centimeters below three years, 3 to 6 cubic centimeters from three to ten years, and 6 to 8 cubic centimeters if above ten years of age, measles does not develop. In this case there is both an active and a passive immunity, since the infected subject has received both serum and virus. The duration of the immunity varies (about three weeks).

Serum Attenuation.—Injection into the subject in the second half of the stage of incubation, about the seventh or ninth day, decreases the intensity of the disease.

Local Serum Inhibition.—Upon injection of serum into the subject at the beginning of the disease, the serum no longer has general immunizing power, but it prevents locally the eruption around the point of injection.

Serum Therapy.—If serum be injected after the appearance of the eruption, it may be active in malignant hypertoxic measles, when injected intravenously in large doses.

The practitioner cannot himself prepare the convalescents' serum, but should apply to the laboratory of a hospital receiving measles cases.

Uncomplicated Measles.—Only a restricted amount of light should be admitted into the sick-room, on account of the photophobia, which is sometimes very marked. Red light, advocated by some, has no appreciable advantage.

Hemorrhagic Measles.—Injections of camphor in oil, physiologic salt solution and strychnine.

Injections of horse serum do not seem to have proven efficacious; the serum may, however, be applied to the gums and nostrils.

Cold baths are contraindicated.

Respiratory Complications.—*For the cough*, which is sometimes tiring to the patient, a syrup containing 0.05 per cent. of extract of opium mixed with syrup of ether (2 per cent. of ether) may be given; or, if necessary, syrup of morphine (0.05 per cent. of morphine), one teaspoonful per year of age, not exceeding four teaspoonfuls in twenty-four hours, in children. The most effective measure, however, is a moist chest pack at 35° C. (95° F.).

Continuous aromatic vaporizations in the sick-room are indicated.

False croup, a frequent condition at the onset of measles, calls for hot, moist compresses in front of the neck, bromides in a liquid preparation, and inhalations of steam.

Morbillous Croup.—This complication is serious and may require intubation or tracheotomy.

Intubation is generally ineffective; it may be dangerous, traumatizing the laryngeal mucosa and favoring bronchopulmonary infection.

Tracheotomy is here a more favorable procedure than intubation.

In all cases, even before the report on the culture is received, an injection of diphtheria antitoxin should be given.

Incipient Diffuse Bronchitis.—Cupping. Moist chest packs at 25 to 28° C. (77 to 82.4° F.); a little mustard may be used, if desired.

One should be very sparing of the sedatives, especially the opiates. An expectorant mixture of ipecac, ammonium acetate and sodium benzoate should be prescribed.

Bronchopneumonia.—Tepid baths (35° C.—95° F.) morning and evening, and one or two mustard chest packs in the course of the twenty-four hours.

Injections of camphor in oil, two, three or four times in twenty-four hours.

Oxygen inhalations, or even hypodermic injections of oxygen.

In grave cases, intramuscular or intravenous injections of electrar-gol or colloidal gold; or, inunctions of a 15 per cent. ointment of collargol.

Hypodermic injections of antipneumococcus and antistreptococcus serum may also be given.

The fixation abscess may be tried in very grave cases.

Otitis.—Five or six drops of 1:30 phenol in glycerin, with or without laudanum, may be dropped in the ear twice a day and a slightly moist, warm dressing applied over the whole region of the ear.

Puncture of the drum membrane, in the event of intense pain, will often hasten the course of the otitis.

Gangrene of the Mouth. Noma.—This condition is now rare. The treatment consists of free irrigations of the mouth with 1 liter of warm boiled water to which has been added one tablespoonful of Labarraque's solution [*Liquor soda chlorinata*, U. S. P.]. Local applications of hydrogen peroxide solution, tincture of iodine, or methylene blue, and, if required, neoarsphenamin. Sometimes it is necessary to cauterize with the galvanocautery.

Conjunctivitis with a Suppurative Tendency.—The eyes should be irrigated three or four times a day with a 1:10,000 solution of mercury oxycyanide. If required, instillations of 1 drop of an argyrol collyrium should be employed.

Convalescence.—The patient should be allowed to get up only ten days to two weeks after the eruptive stage, and to go out only at the end of the third week.

MUMPS.

Prophylaxis.—*Sources of infection*: Mucous secretions of the mouth and pharynx.

Period of transmissibility: At the onset particularly, as well as during the acute stage as a whole.

Isolation necessary.

Disinfection: Disinfection of the clothing, linen, bedding and expectorated material advisable.

General Treatment.—The general hygienic measures are those relating to the infectious diseases in general. (See *General Treatment of the Infectious Diseases*.)

Unduly severe pain in the parotids or testicles should be allayed with the preparations of *opium*.

Stress should be laid on oral antisepsis.

The patient should stay in bed at least four or five days, even when the constitutional symptoms are slight or absent.

He should remain in the room until about the twentieth day.

Patients should not perform work requiring physical exertion until after the lapse of a month.

These precautions are necessary on account of the frequency of orchitis even in the mildest cases of mumps.

Before feeding is resumed, the urine should be examined for albumin (the possibility of nephritis due to mumps should be borne in mind).

Local Treatment.—The parts may be rubbed with 10 per cent. camphor in oil of anthemis (a 10 per cent. maceration of anthemis in olive oil), with compound oil of hyoscyamus (N. F.), or with an ointment of guaiacol:

R Guaiacolis 0.9 c.c. (℥xiv);
 Petrolati,
 Adipis lanæ hydrosi āā 10 grams (ʒiiss).

M. Sig.: Apply locally and cover with a sheet of gutta-percha and a fairly tight dressing.

A warm covering of cotton may be applied over the parts.

Treatment of Complications.—*Rheumatism.*—Sodium salicylate, 4 to 6 grams (1 to 1½ drams) a day, is effectual in a considerable proportion of the cases.

Meningeal Symptoms.—Warm baths (38° C.—100.4° F.); lumbar puncture.

Orchitis.—The pain should be allayed with sodium salicylate or opium preparations; occasionally an injection of morphine is required.

Locally, hot poultices with laudanum may be applied, and a mercurial ointment or 5 per cent. guaiacol ointment may be used. A cotton dressing making slight pressure should be applied and the scrotum elevated.

Treatment of Sequelæ.—*Testicular Atrophy.*—Electricity in the form of weak galvanic or faradic currents; results dubious.

Anemia.—Cinchona, iron, codliver oil.

SCARLET FEVER.

Prophylaxis.—*Sources of infection:* Secretions from the mouth and pharynx; desquamation.

Period of transmissibility: Scarlet fever is now known to be transmissible from the onset. When the scales carry the infection, this is because they have been soiled with the mucous discharges from the nasal cavities and pharynx.

Isolation: Thirty-five days.

Treatment of Uncomplicated Scarlet Fever.—*Diet.*—An exclusive milk diet should be continued until the fever subsides. The milk diet is of extreme importance on account of the frequency of nephritis.

When the temperature has been normal for several days and the appetite is beginning to return, chocolate, coffee with milk, milk soup, and then eggs, may be added.

Only after about a week on this diet, with the amount of food taken thus gradually increased, should meat and vegetables be allowed, with the exception of fish, pork and spiced articles. Even when the patient has resumed a normal solid diet, he should drink only milk at his meals, and in the intervals, 1 to 2 liters of milk, according to his age. This mixed milk diet should be continued until the fortieth day or longer. The chloride-free diet, which has been advocated by some, is much inferior to the milk diet.

The patient should *stay in bed* 2 to 3 weeks, according to the severity of the disease. He should not leave the house before the fortieth day.

In the stage of desquamation, in order to fix the scales and shorten this stage, the entire body should be anointed repeatedly with an acid ointment, such as $2\frac{1}{2}$ per cent. tartaric acid in petrolatum, or with fresh lard, or oil warmed on a water-bath.

Serum Treatment.—The principal agency having to do with secondary infections in scarlatina is the streptococcus. Antistreptococcus serum has therefore been used for these complications.

Marmorek's antistreptococcus serum has been used, unsuccessfully.

Moser's antiscarlatinal serum, prepared with streptococci obtained from the patients themselves, seems to possess greater value. It is used in large doses, such as 100 to 120 cubic centimeters. Its utility is, however, not as yet entirely established.

Convalescents' Blood.—This method of hemotherapy consists in injecting intramuscularly 10 cubic centimeters of convalescents' blood in patients between one and two years of age, or 20, 25, and up to 40 cubic centimeters, in older children and adults. In cases of intermediate severity two daily injections of 10 to 15 cubic centimeters suffice. If the blood cannot be injected immediately care should be taken to moisten the syringe well with a 10 per cent. solution of sodium citrate.

This treatment is indicated mainly in malignant scarlet fever. It must be instituted as promptly as possible. The results are stated to have been very encouraging.

[Encouraging therapeutic results have been obtained with the newer immune horse serums prepared by Dochez and by G. F. and G. H. Dick. Dochez's serum is described as "scarlatinal antistreptococcic serum." In a series of cases reported by Blake, Trask and

Lynch, single intramuscular injections of 40 to 60 c.c. of this serum resulted in complete recovery in 12 to 24 hours. Bly found that this serum brought about more rapid improvement of toxemic symptoms and an earlier disappearance of the eruption than did convalescents' blood or serum. Dick and Dick, immunizing the horse with the sterile filtrate from cultures of the hemolytic streptococcus they regard as the cause of scarlet fever, obtained a "scarlet fever antitoxin" of which 10 c.c. was able to neutralize 20 times the amount of toxin that produced vomiting, malaise, fever and a scarlatinal rash in susceptible adults. Clinical trials of this serum have been successful, recovery being hastened and the incidence of complications reduced.]

Complications.

Nephritis.—The onset of this commonest and most important of the scarlet fever complications is often insidious and requires, to be detected in time, constant watching and a daily urine examination.

The complication should be very actively treated.

1. An exclusive milk diet is imperative.
2. From the start, four to ten wet cups, according to the patient's age, should be applied over the kidney regions, and on the succeeding days, dry cups.
3. Next day, active purgation with compound tincture of jalap and syrup of frangula in a little weak tea.
4. On the succeeding days, tannic acid in solution, pills, capsules or cachets (0.2 to 1 gram—3 to 15 grains), according to age.
5. Diuretic decoctions (broom tops, triticum, juniper berries, etc.).
6. If nephritis persists, give iodotannic syrup (N. F.) for a prolonged period, in alternation with strontium lactate.

In *scarlatinal anasarca*, theobromine or theobromine sodiosalicylate (0.5 to 3 grams—7½ to 45 grains—according to age) should be added.

In *uremia*, a purgative enema should be given, one or two leeches applied behind each ear, and, if necessary, venesection carried out.

Anginose Scarlet Fever.—When the angina is very intense; it should be energetically treated by means of copious throat irrigations with the fountain syringe, repeated every two or three hours. A solution of hydrogen peroxide with addition of sodium bicarbonate should be used. Local applications of 10 per cent. phenol in glycerin should likewise be made. The secondary anginas, nearly always diphtheritic, should be treated with injections of diphtheria antitoxin.

Scarlatinal Rheumatism.—Sodium salicylate fails to allay these joint disturbances, even when mild. Applications of tincture of iodine should be made and hot fomentations used. Acetylsalicylic acid or antipyrin should be prescribed.

In the suppurative variety, arthrotomy should be resorted to.

Glandular Swellings.—These may tend toward resolution, in which case iodized ointments and applications of compresses moist with hot saline solution may suffice.

If supuration occurs, the surgeon should be called in without delay. If the abscess is a very deep one, most serious results may attend the detachment of the tissues.

Otitis.—Five or six drops of 1:30 phenol in glycerin, with or without laudanum, should be dropped in the ear twice a day and a slight moist, warm dressing applied over the region of the ear.

Puncture of the drum membrane frequently hastens the course of the otitis.

TETANUS.

Prophylactic Treatment.

I. *Very careful disinfection* of wounds attended with crushing or necrosis of the tissues or contaminated with tetanus-bearing substances, *viz.*, earth, road dust, street dust, garden soil or manure.

The tetanus bacillus being anaërobic, the depths of recessed wounds and deep foci of traumatism should be opened up for the admission of air and the wounds freed of suspicious foreign bodies, bone fragments, splinters, etc. Protruding bits of tissue should be removed and the wound trimmed and debrided, if necessary with the thermo-cautery. It should then be painted with tincture of iodine and an aseptic dressing applied.

II. *Prophylactic injection of antitetanic serum.* (See Part I: *Serum Therapy*).

III. *Isolation of tetanus cases.*

IV. *Disinfection* of the dressings, instruments, etc., that have come in contact with a suspicious wound. Disinfection of the premises.

Curative Treatment.

In established tetanus, all treatment frequently fails: The tetanus toxin becomes fixed in the nerve cells, where it seems to enter into a stable combination.

The treatment is required to meet three main indications:

1. To remove the focus of infection and thus prevent the diffusion of further amounts of toxin through the system (*surgical treatment*).

2. To combat the intoxication by neutralizing the poison circulating in the blood with very large doses of serum (*curative antitetanic serum treatment*).

3. To counteract the effects of the intoxication (excessive spinal irritability) and stimulate the processes of defence (*symptomatic treatment*).

Surgical Treatment.—The experiments of Roux and Vaillard have shown that, in animals, removal of the focus of infection considerably favors recovery.

Some surgeons advise amputation as soon as possible: 1. When the injuries are severe, involving the bones, joints and nerves and separating the muscles and skin. 2. When they involve only unimportant portions of the limbs.

Others regard amputation as generally useless when it is decided on, the tetanus toxin having already reached the nerve centers.

At all events, the contaminated wound must be cleansed, infected foci freely debrided with the thermocautery, and all recesses curetted.

Specific Treatment. Serum Therapy.—The final conclusions adopted at the Fourth Interallied Congress for the study of war wounds were to the effect that the efficacy of the curative serum treatment of tetanus was still a matter for further investigation.

For details as to the use of serum, see Part I: *Serum Therapy*.

[The plan of serum treatment approved by the Board of Health of New York City is as follows: (1) Intraspinal (lumbar) injection of 3000 to 5000 units, the volume of fluid injected being brought up to 10 or 15 cubic centimeters by addition of sterile saline solution, the exact volume depending on the age of the patient and the amount of spinal fluid withdrawn. (2) Intravenous injection of 10,000 units at the same time. (3) Repetition of the intraspinal dose in 24 and 48 hours. (4) Subcutaneous injection of 10,000 units four days later.

E. V. Smith states that many cases are reported cured with 60,000 to 100,000 units. Severe cases may require 150,000 to 200,000 units. Freedlander recommends 10,000 to 20,000 units intravenously several times daily. Injection of small doses in the tissues around the wound has been advised by R. H. Miller.—Tr.]

Symptomatic Treatment.—The patient should be isolated in a dark room. Carpet on the floor is of advantage to deaden the sound of footsteps [or rubber-soled shoes may be used by the attendant].

The room temperature should be about 20° C. (68° F.).

The patient should be spared all necessity for motion. A long gutter-splint such as is used for fracture of the pelvis or neck of the femur is one of the best means of procuring this result.

Before trismus prevents feeding in the natural way, closure of the jaws should be prevented by means of a wooden wedge kept between them continuously. A soft catheter inserted through one of the nostrils will, if necessary, serve for the introduction of food.

If cyanosis sets in as a precursor of asphyxia, tracheotomy should be resorted to.

Chloral Hydrate.—This should be given in large amounts, such as 6 to 10 grams (90 to 150 grains) a day in divided doses; as much as 15 grams (225 grains) can be given in twenty-four hours.

If its administration by the mouth is impossible, the chloral should be given in enemas.

Hypodermic injections of morphine, potassium bromide, and inhalations of chloroform may be availed of as adjuncts to chloral hydrate.

Bacelli's Method.—In this procedure a 2 or 3 per cent. aqueous solution of phenol is used.

The treatment begins with a hypodermic injection of 0.3 to 0.5 gram (5 to 7½ grains) of phenol daily, the urine being watched. The dose is then increased to 0.75, 1 and even 1.5 grams (12, 15 and 22½ grains) a day in several doses.

These large doses should be used only in grave cases.

Bacelli's method was modified by Talamon as follows:

Every four hours there is injected in the subcutaneous cellular tissue on the outer aspect of the thigh or the anterior aspect of the abdomen 20 cubic centimeters (5 fluidrams) of 1 per cent. phenol solution:

℞ Phenolis	10 grams (3iiss);
Glycerini puri	40 c.c. (f3x);
Aquæ destillatæ	q. s. ad 1000 c.c. (f3xxxiv).
S. et sterilisa.	

Six such injections are given in the twenty-four hours, making up a total of 1.2 grams (18 grains) of phenol. No toxic effects are observed other than the dark discoloration of the urine.

The procedure is to be kept up as long as the muscular contractures are present, *i.e.*, for two or three weeks. Thereafter, 0.6 gram (9 grains) a day is injected for eight or ten days.

Intraspinal Injections of Magnesium Sulphate. (Blake's method).—Lumbar puncture is carried out and a certain amount of cerebrospinal fluid withdrawn, after which a 25 per cent. solution of magnesium sulphate is injected to the amount of 1 cubic centimeter (16 minims) per 25 kilograms (55 pounds) of body-weight. This is repeated for four or five consecutive days.

This procedure has been known to induce rather serious symptoms, such as temporary paraplegia or retention of urine and slowing of the respiration; even death three hours after the injection has been observed. It should therefore be used cautiously.

TYPHOID AND PARATYPHOID FEVERS.

The course of the disease varies somewhat according as there is infection with the typhoid bacillus or the paratyphoid bacilli A or B, but the treatment, on the whole, follows the same lines in all three conditions.

Prophylaxis.—*Sources of infection:* Feces and urine.

Isolation: Until recovery, with specimens of the excreta negative on bacteriologic examination. Some convalescents remain carriers, harboring germs either in the urine or the gall-bladder and feces, and if the examination shows that bacilli are being passed, the case should be isolated further and hexamethylenamin given.

Preventive Vaccination.—"Thanks to (antityphoid) vaccination, civilized countries will witness the disappearance of typhoid fever in the twentieth century just as they saw smallpox disappear in the nineteenth" (Chantemesse). Experience in the world war demonstrated that this statement was justified.

Antityphoid and antiparatyphoid vaccination, now regularly insisted upon in the armies of various nations, should be recommended to all persons who are called upon to take care of typhoid patients, and during epidemics, to all those who may be exposed to the infection.

Many kinds of vaccine have been used. In the French army the following two types of vaccine have proven satisfactory:

1. *Polyvalent, triple* ("T. A. B.") *vaccine* (Vincent).—This is a type of vaccine prepared with several strains of typhoid bacilli and A and B paratyphoid bacilli.

Four injections of 0.33, 0.5, 1 and 2 cubic centimeters of the vaccine are given at weekly intervals. [In America the number of vaccine injections is usually three.—Tr.]

2. *Lipovaccine* T. A. B. (Le Moignic).—This is a mixed vaccine for all three germs which has the advantage of procuring vaccination by means of a single injection of 1 cubic centimeter.

The lipovaccine consists in a suspension in oil of bacilli killed by heat and eugenol. The object of the oily excipient is to show the absorption of the bacilli and attenuate their toxic effects, this, in turn, permitting of the injection of the entire amount in one vaccinating dose. In using it, none of the instruments employed should be moistened with water, as the bacteria, passing readily from the oil into the water, would then be absorbed too quickly. The ampoule is well shaken for a minute before use. The injection is made in the

subcutaneous cellular tissue of the deltoid region, preferably on the left side. With the patient seated and the area painted with tincture of iodine, the needle is introduced for a distance of about 2 centimeters ($\frac{4}{5}$ inch); one should make sure that it has actually passed through the dermis, is freely movable beneath the integument and has not penetrated into muscle, and that no blood is escaping. On the day of the injection and the next day, the subject should avoid all fatigue and restrict himself to a light diet. He should not expose himself to cold.

Temporary Contraindications.—Depression. Febrile states.

Permanent Contraindications.—Poorly compensated organic heart lesions. Established tuberculosis. Chronic lung affections that may react on the heart (emphysema, asthma, chronic bronchitis). Renal insufficiency with albuminuria exceeding 0.5 gram, or disturbances of function pointing to inadequate elimination, or high blood-pressure. Hepatic disorders.

Revaccination.—The procedure should be repeated at the end of a year.

General Hygiene of the Typhoid Patient.—Too much stress cannot be laid on the hygienic measures, recovery of the typhoid case being often actually the result of minor items of care intelligently carried out night and day.

Aside from the minor measures required in all infectious diseases, the sacral and gluteal regions should be more carefully observed than usual, especially in lean subjects: A small, insignificant injury may rapidly lead, in forty-eight hours, to an extensive bed sore. At the slightest evidence of trouble the patient should be placed on a rubber ring, or better, if possible, on a water mattress, and still greater pains taken in the aseptic precautions.

Skin infections should be prevented by applying tincture of iodine to points of folliculitis and small purulent vesicles.

Any furuncle noted should be incised and covered with an occlusive dressing of zinc oxide or other suitable plaster.

Diet.—1. THE CLASSIC DIET.—To consist exclusively of about 3 liters of milk a day. (See *General Treatment of Infectious Diseases*.)

Feeding of solids to begin only after the temperature has been normal for at least two days, with the pulse slow and the tongue clear.

2. THE MORE SUBSTANTIAL DIET.—In recent years it has been proposed to feed typhoid cases more freely, even at the height of the disease.

There is no doubt that typhoid patients sufficiently fed show relatively little prostration, have a moist tongue, have no bedsores and lose less weight, and that their convalescence is remarkably shortened.

It should be kept in mind, however, that in typhoid cases the appetite is much reduced, the digestive secretions very insufficient, and that not all food will be borne with the same ease. Intestinal complications are, if anything, rather uncommon in the fed patients. Relapses are said not to be more frequent.

Carbohydrates.—A few spoonfuls of cereal flour (cream of rice or barley) may be added to the milk, increasing its digestibility. The milk may be replaced by light gruels made with vegetable bouillon.

Claisse recommends mashed potatoes and boiled bread preparations strained and slightly salted. Well-cooked rice cakes and mush, sprinkled with the juice of sweet fruits, and zwieback and thin slices of buttered bread may also be given.

Fats.—Butter may be given in small quantities.

Proteins.—There is much more disagreement as to the giving of proteins.

Vaquez's Diet.—This diet is ordered indiscriminately for all patients except those with marked tympanites. It is interrupted only in the event of intestinal hemorrhage.

Every two hours the patient receives a bowl of milk or soup made from flour, or an egg, raw or in the form of a cream (up to two or four eggs a day).

Beginning on the tenth day there is added a wineglassful of meat juice, or a jelly, and a teaspoonful of somatose in milk.

Only about the fifteenth day, when defervescence is becoming distinct, does the patient begin to take 100 grams of raw, scraped mutton or some of the middle portion of a ham.

Antipyretic Measures.

1. MEDICINAL ANTIPYRESIS.—Quinine in moderate doses alone deserves consideration as an adjunct to hydrotherapeutic measures.

In the mild cases, quinine should be combined with cold sponging, or may be administered alone.

Quinine is, however, an irritant to the stomach, and in the severe and grave cases it has no effect on the temperature.

2. HYDROTHERAPY.—This subject has been discussed in other sections of the work (see *General Treatment of Infectious Diseases and Fever*). It need, therefore, be only briefly described here.

Whatever hydrotherapeutic measure be used, the chances of recovery are greater if it has been started early.

Brandt's Method.—This consists in giving a bath at a temperature of 20° C. (68° F.), of ten to fifteen minutes' duration, whenever the rectal temperature, taken every three hours day and night, reaches or exceeds 39° C. (102.2° F.).

Most physicians now avoid baths having a temperature below 24 or 26° C. (75.2 to 78.8° F.), and frequently the initial bath is given at 32° C. (89.6° F.), and the succeeding baths each lowered by 2° C. (3.6° F.).

It may happen that circumstances hardly permit of baths being given at night: It should then be made a rule that the last bath is to be given, whatever be the patient's temperature, at 9 p.m., and the first bath of the next day at 7 a.m.

Sometimes it happens that the temperature, taken immediately after the bath, is as high as it had been before. If this condition continues after a few baths, it should be taken to mean an exceptional seriousness of the disease. The temperature of the bath will have to be reduced, or its duration increased up to twenty minutes. This is particularly the case in obese subjects, who are markedly resistant to refrigeration.

As a rule, the temperature, already somewhat lower when the patient is taken out of the bath, diminishes progressively after he has been put back to bed. The height of the temperature remission is observed at the end of twenty to thirty minutes, coinciding with a feeling of well-being and drowsiness. A total temperature reduction of 1° C. (1.8° F.) should be regarded as very satisfactory. This reduction lasts but a short time, however, and soon the temperature begins to rise again toward the preëxisting level.

The rectal temperature may, especially in children, be observed to drop 3 or 4° C. (5.4 or 7.2° F.), or even more, while shivering continues long after the bath. Under these circumstances cold water should be used in great moderation, as collapse has been witnessed in such cases.

Contraindications: Perforation, peritonitis, intestinal hemorrhage.

Heart weakness is a relative contraindication, calling for certain precautions rather than complete abstention from the method.

Adynamia should lead to a preference for tepid baths made gradually colder.

Neither the onset of menstruation, pregnancy, bronchitis, nor even pulmonary congestion should cause interruption of the cold baths.

Tepid Baths.—Baths at 30 or 35° C. (86 or 95° F.) are less stimulating and less cooling than the cold baths. They may be used in the milder cases and in the stage of decline.

Tepid Baths of Progressively Lowered Temperature.—These are appropriate in aged patients, adynamic cases, where there is heart weakness, and in pusillanimous persons.

Tepid Half-baths with Cold Affusions.—Recommended by Chantemesse for use where there is restlessness, delirium and a tendency to hypothermia.

The patient is seated in a warm bath (36° C.—96.6° F.), the water extending up to his waist. Cold water (about 17° C.—62.6° F.) is sprinkled over his head, chest and back from a can. He is then taken out of the bath at once and warmed up.

Cold Affusions.—Hardly more than 0.5° C. (0.9° F.) of temperature reduction is obtainable with this procedure.

Cold Sponging.—This exerts a sedative action, but causes only an indifferent temperature reduction.

It is used in the milder cases, patients with syncopal tendencies, and patients who have just had intestinal hemorrhage.

Wet Sheet.—This has a more pronounced refrigerant action than cold sponging. It should be used in children when a bath-tub is not available.

Cold Applications.—Ice-bags (or compresses dipped in ice water and renewed every ten minutes) applied over the heart, or better, over the abdomen.

The ice-bag, provided it be continuously applied, may in many instances replace the bath treatment.

[In the United States cold sponging has, in late years, been increasingly substituted for the cold baths. Sponging with water at room temperature may be carried out whenever the temperature reaches 102.5° F., and continued until a reasonable temperature reduction has been effected. Where cold sponging proves insufficient, the patient may be wrapped in a doubled sheet wrung out of cold water, with or without a blanket as an outer covering. This "cold pack" may be continued for one-half to one hour.—Tr.]

Antiseptic Medication.—Purgative medication is dangerous, as it irritates the already diseased mucous membrane. Antiseptic medication, however, is of service.

Calomel (0.4 gram—6 grains—in divided doses for three or four days) or charcoal, naphthol, or lactic acid may be employed.

Methenamine, on account of its elimination through the biliary passages, which constitute one of the main foci of development of the typhoid bacillus, has been recommended in doses of 1 to 2 grams (15 to 30 grains) a day.

Serum and Vaccine Treatment.—*Serums.*—Many antityphoid serums have been prepared. The preparation of antibacterial serums has, in particular, been sought. The results, however, have been questionable, and such serums have not passed into general use.

Vaccines.—The treatment of typhoid fever by vaccine injections has not yet been generally taken up; the few instances of favorable results reported require confirmation.

TREATMENT OF COMPLICATIONS.

Nervous Complications.—In the presence of violent and persistent headache, lumbar puncture may be resorted to.

Digestive Tract.—**DIARRHEA AND TYMPANITES.**—The cold baths sometimes suffice to overcome the diarrhea and meteorism. Cold compresses or an ice-bag may be applied over the abdomen.

If the diarrhea continues, intolerance of milk should be thought of and the different measures alluded to under the *General Treatment of Infectious Diseases* employed.

Kephyr and lactic acid lemonade are of real service in these cases. Bismuth subnitrate and starch enemas with addition of a few drops of laudanum may also be given.

Persistent meteorism should be combatted with a large catheter introduced as high as possible in the rectum.

INTESTINAL HEMORRHAGE.—See Part III: *Intestinal Hemorrhage*.

INTESTINAL PERFORATION.—The baths should be stopped and likewise the enemas and all feeding, even of fluids.

The bowel should at once be immobilized by the administration of opium or an injection of morphine, and an ice-bag over the abdomen.

A surgeon should be called in as quickly as possible: The earlier the operation, the greater its chances of success. In the meantime, injections of ether, camphor in oil, sparteine and strychnine may be given.

In doubtful cases, in which there are merely signs of peritoneal irritation, the course followed should be the same as if perforation had occurred, for simple peritonitis from extension of inflammation through the bowel wall is rare and its signs are similar to those of perforation. In these cases Chantemesse recommended intramuscular injections of a solution of sodium nucleate.

Klippel and Feil have recorded an authentic case of spontaneous anatomic recovery from a typhoid perforation (*Presse méd.*, Aug. 16, 1922). As these observers write, "it is important to know that it is possible for a typhoid perforation to undergo spontaneous recovery."

CHOLECYSTITIS.—Absolute immobility. Skimmed milk.

An ice-bag continuously over the gall-bladder region.

Methenamine and sodium salicylate in fractional doses. After five or six days, the fever generally shows a declining tendency and

the tumefaction subsides. Relapses are, however, a possibility. If, on the other hand, the fever persists, if jaundice appears, or if the local evidences of suppuration continue, there should be no hesitation in resorting to surgical measures (cholecystectomy and drainage of the gall-bladder).

Pulmonary Complications.—In the event of bronchitis or congestion of the lungs, the cold bath should be continued.

In the event of pneumonia or bronchopneumonia, however, if the heart shows weakness, tepid baths made progressively colder should be employed.

Complications Relating to the Urinary Tract.—**PYELONEPHRITIS.**—As long as there is no retention of urine, a milk diet and methenamine or helmitol should be prescribed. If there is retention with deep lumbar swelling and severe constitutional symptoms, surgical intervention is imperative.

In the event of *retention of urine* in the course of a case of typhoid fever of the adynamic or nervous form, catheterization should be carried out only with very careful antiseptic precautions and every evacuation followed by bladder washing with a weak solution of potassium permanganate.

TREATMENT DURING CONVALESCENCE.

A much more cautious course should be followed during convalescence from typhoid fever than during that from any other infectious disease. Relapse may occur as late as the tenth or twelfth day after the temperature has returned to normal. Serious collapse may likewise occur.

The diet should be very closely supervised by the physician. The general rules already outlined with reference to the infectious diseases in general should be followed.

One must not give in to the patient's appetite. Bread should not be allowed until the fifth or sixth day of convalescence, in very small amounts, and only once a day, with the patient directed to masticate it well.

The patient should not be allowed out of bed during the first week of convalescence. Exertion, visits, and prolonged conversation or reading may cause the temperature to go up again temporarily.

During convalescence, *osteoperiostitis* may develop; it may be treated with antityphoid vaccine, but may require a surgical operation.

Progressive ulcerations of the larynx may lead to *edema of the glottis*. This complication is, however, becoming more and more rare. The edema of the larynx may require immediate tracheotomy.

TREATMENT OF RELAPSE.

In the event of a relapse, there should be no hesitation in resuming the cold baths if the temperature remains above 39° C. (102.2° F.) and the general condition is not satisfactory.

VARICELLA.

Prophylaxis.—*Sources of infection:* Scales and crusts.

Period of transmissibility: Eruption and desiccation.

Isolation: Sixteen days.

Treatment.—In uncomplicated cases, which are the rule, a few general hygienic measures will be all that is required. (See *General Treatment of Infectious Diseases*).

Itching and scratching, which are the cause of scarring and of small abscesses that may complicate the disease, should be met with borated petrolatum or compound dusting powders (*e.g.*, phenyl salicylate, boric acid and starch in equal parts).

In small children, the hands should be wrapped up in cotton dressings.

If the vesicles are very large and lead to an apprehension of ulcer formation, a plaster of phenyl salicylate should be applied, and if the ulcerations assume the features of ecthyma, antiseptic sprays should be used and Vidal's red plaster [red mercuric oxide, 3 parts; lead oxide, 5 parts, and diachylon plaster, 52 parts] applied.

VARIOLA.

Prophylaxis.—*Source of infection:* Scales and crusts.

Period of transmissibility: Eruptive stage and desquamation.

Isolation: Strict isolation essential.

Vaccination and Revaccination: See Part I: *Vaccine Therapy*.

Treatment in the Stage of Invasion.—*For the backache:* Rubbing with one of various liniments or the application of dry cups.

For the vomiting: Cracked ice, carbonated waters.

For the constipation: Glycerin enemas, mild laxatives.

The appearance of the eruption may be promoted by the measures alluded to under the *General Treatment of Infectious Diseases*.

Tepid tub baths (36° C.—96.8° F.) with addition of 10 to 15 grams ($\frac{1}{3}$ to $\frac{1}{2}$ ounce) of mercury bichloride in alcoholic solution or of 20 grams ($\frac{2}{3}$ ounce) of betanaphthol constitute a good prophylaxis.

lactic procedure for the prevention of secondary infections of the skin.

At the start one of the *abortive methods* may be tried, the least dangerous of which is *Du Castel's ether-opium method*: One cubic centimeter (16 minims) of ether is injected every two or three hours into the buttock (to avoid abscesses the injections should be made deeply and with thorough asepsis) and at the same time 0.2 gram (3 grains) of extract of opium given by the mouth. The patient also receives daily 50 to 100 cubic centimeters ($1\frac{2}{3}$ to $3\frac{1}{3}$ fluidounces) of alcohol and 20 drops of tincture of ferric chloride. This treatment is asserted to cause, frequently, lessening of the eruption and of suppuration, and of dysphagia and delirium.

Xylol is also of advantage, causing a kind of flattening down of the eruption and reducing suppuration; it reduces the scarring to a minimum. It is given in doses of 50 to 70 drops, and up to 100 drops after several days, in four or five doses daily, in milk or wine. In children the dose is 15 to 40 drops.

This symptomatic treatment suffices in ordinary cases.

In the cases with high fever, cold, or rather, tepid (30° C.— 77° F.) baths are given, together with stimulants, etc. (See *General Treatment of Infectious Diseases*).

Treatment in the Eruptive Stage.—Antisepsis of the skin should be the main object.

The *red light* treatment consists in protecting the patients from the chemically-acting rays of the solar spectrum, which, according to Finsen, are the only rays that exert an actual irritant action on the skin, favoring diapedesis of the leukocytes. The patients are placed in a room provided with window panes of red glass, or over the windows of which are pasted sheets of the red paper used in photography. Under these circumstances the vesicopustules are stated to dry up rapidly and suppuration frequently to be avoided.

The *topical treatment* consists in the application of petrolatum containing boric acid or phenyl salicylate. Over the scalp and about the mouth, etc., it is more suitable to apply muslin moistened with a 1:4000 solution of mercury bichloride, to be left on one-half hour and covered with oiled silk; this is repeated twice a day.

If the eruption is very abundant, each dressing may be followed by the *spraying* of warm water containing phenol or of 1:1000 mercury bichloride solution for five minutes, care being taken to protect the eyes with wads of cotton moist with boric acid solution. Applications of *phenolated fuchsin* have also been recommended.

Furthermore, the smallpox patient should be given a daily tepid antiseptic bath in water containing 10 or 15 grams ($\frac{1}{3}$ to $\frac{1}{2}$ ounce) of mercury bichloride or 20 grams ($\frac{2}{3}$ ounce) of betanaphthol.

As a result of all this careful attention to antiseptics of the skin, prevention of the undesirable effects of suppuration may be hoped for.

Treatment in the Stage of Suppuration.—Often the temperature goes up again in this stage and serious symptoms appear.

Symptomatic treatment similar to that called for in all severe febrile disorders should be instituted.

Tonics and nerve sedatives should be prescribed. The antiseptic procedures relating to the skin are to be continued.

Refrigerant treatment should be instituted, especially in the form of tepid baths, gradually cooled, three or four times a day; cold baths, as applied in the Brandt method, are often poorly borne.

At the same time Du Castel's ether and opium treatment should be continued; it seems to act by stimulating the nerve centers, permitting the system to react against the smallpox virus.

Treatment of Complications.—It is during the period of suppuration that many complications appear, *e.g.*, myocarditis and endocarditis, bronchopneumonia, edema of the glottis, etc.

The customary treatment for each of these conditions should be availed of, the smallpox in no wise altering the indications.

The eyes should be carefully watched, and frequent washing with *warm boric acid solution recommended*. Instillations of a solution of *methylene blue* have been asserted to constitute the best preventive and curative treatment for superficial eye complications.

If smallpox pustules are present over the conjunctiva, and especially over the cornea, a camel's hair brush moistened with silver nitrate solution should be lightly brought in contact with them. Specialists recommend a collyrium of eserine sulphate (0.05 gram— $\frac{3}{4}$ grain—to 10 cubic centimeters—2 $\frac{1}{2}$ fluidrams).

Treatment of Hemorrhagic Smallpox.—Calcium chloride, 2 to 4 grams ($\frac{1}{2}$ to 1 dram) a day, and various hemostatic preparations (ferric chloride, ergotin, sulphuric acid, injections of gelatin in physiologic salt solution or of horse serum, etc.) should be prescribed.

Treatment of Smallpox in Pregnancy.—Abortion occurs as a general rule. It takes place most often in the eruptive stage.

Puerperal complications and hemorrhage are frequent. Antiseptic treatment of the vagina and vulva by means of antiseptic irrigations and injections should be carried out several times a day. If the

vulva and labia are the seat of many pustules, an antiseptic dressing should be applied.

Treatment during Convalescence.—Separation of the crusts should be hastened by means of tub baths in which the patient is washed with soap and water and by the spraying of hot boric acid solution over the hair.

Sometimes, when the crusts have fallen off, projecting scars are seen; to remedy these, *resorcinol soaps* or Lassar salicylic pastes should be used first. If this treatment proves insufficient, scarifications or curet-tage of the scars should be resorted to.

When the fever has subsided, the patient should be fed and reconstituent drugs prescribed.

The patient should not be allowed to go out until all the scales have fallen off.

WHOOPING-COUGH.

Prophylaxis.—*Sources of infection:* Oral mucus and sputum.

Period of transmissibility: Especially before and at the onset of the paroxysmal stage.

Strict isolation: Especially at the start.

Disinfection: Advisable where there has been a complicating broncho-pneumonia.

Curative Treatment.—The following lines from Le Gendre's work entitled "*Thérapeutique infantile*" are of interest in this connection.

"The whole series of known antiseptics has been gone through in the treatment of this disease, and each day there is being brought out some new form of treatment or some old treatment is being revamped; it would be useless to enumerate all these treatments. I believe, for the moment, that the best treatment is that which tires the children the least; I do not believe that we are able with any drug to reduce the duration of the paroxysmal stage. When cases of whooping-cough are being cared for in a hospital, the attendant does his full duty if he insures for them strict hygienic care and comforts them by reducing their coughing spells, insuring a proper intake of food and combatting their complications, and he can convince himself by a few years of observation of a large number of patients that independently of all treatment there are prolonged cases of whooping-cough and short ones.

"In private practice, and among any class of people, the physician finds himself in a peculiar position. If he definitely expresses his opinion as to the uselessness of all supposedly curative treatments,

either he will not be called again or all the treatments suggested by advertisements or tradition will be tried without his knowledge. It is therefore better that he should not advertise his skepticism, and he is justified in allowing the trial of harmless measures: He can thus retain the management of the treatment and that measure of control which is in the interests of his little patients through his opposition to polypharmacy and patent medicines."

* * *

The general principles of the treatment of whooping-cough may be summarized in the following two indications:

1. The general hygiene of infections of the respiratory tract.
2. Moderate and supervised antispasmodic medication.

The **general hygiene** should be that suitable in cases of bronchitis (*q.v.*): Isolation in a spacious, easily aired room. If the weather and climate permit, continuous open air life. Free vaporizations of aromatic, antiseptic substances, such as eucalyptus, turpentine, benzoin, phenol, eucalyptol, etc. Painsstaking and systematic antisepsis of the mouth, nose and pharynx with the aid of hydrogen peroxide solution, 1 per cent. phenosalyl solution, or 1 or 2 per cent, resorcinol in liquid petrolatum.

A point constantly being discussed is the extent to which the patient should be allowed to go out: Some recommend that he be permitted to go out freely and regularly every day, on the ground that he needs plenty of fresh air; others, fearing an inflammatory complication the result of exposure, keep the patient shut up in his room throughout the disease, despite its usual long duration. The first of these views, inconsiderately applied, exposes the patient to bronchopulmonary complications; the second leads inevitably to debility and anemia and predisposes the patient to the later development of tuberculosis.

To my mind—and this view appears to be that of the majority of pediatricians—the following type of management is that which gives the best results: *Patient to stay in his room*, the latter airy and regularly ventilated, with the patient gradually accustomed to continuous admission of fresh air, *throughout the acute stage with frequent paroxysms*; *patient to go out regularly and for a prolonged period*, weather permitting and with the customary precautions, *during the stage of decline*; *a change of air*, by removal to another locality, *in the stage of infrequent and short coughing spells*.

All of the **antispasmodics** and **antiseptics** have been recommended in the treatment of whooping-cough. All have apparent cures and

instances of rapid relief to their credit. All, or nearly all, when properly used, are capable of affording a more or less pronounced reduction in the frequency and duration of the coughing spells.

Tincture of belladonna leaves: Under supervision, ascending doses of 3 to 6 drops per year of age can be prescribed, with or without addition of the tinctures of valerian, aconite, digitalis or drosera.

Tincture of aconite: Two drops per year of age.

℞ Tincturæ belladonnæ,
Tincturæ aconiti,
Tincturæ droseræ,
Tincturæ opii camphoratæ,
Aquæ laurocerasiāā 2 c.c. (f3ss).

M. Sig.: Five to ten drops three times a day (for a child of two years).
Increase by one drop a day until an effect is seen.

The following formula was advocated by Trousseau:

℞ Syrupi belladonnæ (1 per cent.),
Syrupi opii (0.4 per cent.),
Syrupi ætheris (2 per cent.),
Syrupi aurantii florumāā 15 c.c. (f3ss).

M. Sig.: Teaspoonful doses, according to tolerance.

Antipyrin.—The daily dose per year of age may be put down as 0.5 gram ($7\frac{1}{2}$ grains). It may be prescribed in powders, to be dissolved in sweetened water, or in a liquid preparation in combination with belladonna and the bromides.

Bromoform, a very active remedy, has to be used carefully. It is best to abstain from its use in children below two years of age and to recognize 4 drops a day per year of age as the average dose above two years. Bromoform is but slightly soluble in water, but is more soluble in oils and in alcohol. It may be given with tinctures, as in the following prescription:

℞ Bromoformi 0.7 c.c. (m xiss);
Alcoholis 24 c.c. (f3vj);
Tincturæ belladonnæ,
Tincturæ aconitiāā gtt. xx;
Syrupi codeinæ (N. F. IV)q. s. ad 100 c.c. (f3iiss).

M. Sig.: One teaspoonful a day per year of age as an initial dose.

The *bromides* may likewise be recommended, either singly or in combination with the agents already mentioned, in an average dosage of 0.2 to 1 gram (3 to 15 grains) per year of age.

℞ Potassii bromidi 2 grams (3ss);
Syrupi codeinæ (N. F. IV) 30 c.c. (f3j);
Aquæ aurantii florum 40 c.c. (f3x);
Aquæ chloroformiq. s. ad 100 c.c. (f3iiss).

M. Sig.: Three teaspoonfuls in the 24 hours per year of age.

Inhalation of *chloroform* has been advocated for severe paroxysms. In these young patients, however, it will be well to combine it with *ether*.

Triboulet and Royé have employed with success, in children over eighteen months of age, injections of *morphine* in ascending doses of 0.0025, 0.0033 and 0.005 gram ($\frac{1}{24}$, $\frac{1}{18}$ and $\frac{1}{12}$ grain).

Of late, *intramuscular injections of ether* have been recommended. One cubic centimeter (16 minims) of pure ether is given up to the age of ten months; then 2 cubic centimeters (32 minims), at the rate of three or four injections on alternate days. The injections are made at Barthélemy's point: With the thigh in extension, a mark is made at the midpoint of a vertical line drawn from the posterior border of the great trochanter to the iliac crest, and the needle introduced 2 centimeters ($\frac{2}{5}$ inch) posterior to this point.

Following are a few other antispasmodic combinations for whooping-cough:

R Potassii bromidi	3 grams (gr. xlv);
Aquæ laurocerasi	2 c.c. (f3ss);
Tincturæ belladonnæ	gtt. xxx;
Syrupi ætheris (2 per cent.)	12 c.c. (f3iij);
Syrupi codeinæ (N. F. IV)	24 c.c. (f3vj);
Syrupi aurantii florum	36 c.c. (f3ix).

M. Sig.: Six teaspoonfuls in the 24 hours for a child of two years.

R Antipyrinæ	3 grams (gr. xlv);
Syrupi belladonnæ (1 per cent.)	18 c.c. (f3ivss);
Aquæ tiliaë	100 c.c. (f3iiiss).—M.
	(MARFAN).

(Dose below two years: One to five dessertspoonfuls a day.

Above two years: Initial amount, five dessertspoonfuls.

Maximal amount, fifteen dessertspoonfuls.)

R Bromoformi	0.35 c.c. (m̄vj);
Codeinæ	0.1 gram (gr. iss);
Alcoholis	12 c.c. (f3iij);
Tincturæ aconiti	gtt. xx;
Aquæ laurocerasi	3 c.c. (m̄l);
Syrupi tolu	36 c.c. (f3ix);
Syrupi aurantii florum	q. s. ad 160 c.c. (f3vss).

M. Sig.: Eight teaspoonfuls in the 24 hours for a child of two years.

Ether-gomenol injections, recommended by Prof. Carrière, of Lille.

An outline of his method follows:

1. Isolation of the patients in separate cubicles.
2. Construction above the patient's bed of a tent of thin cotton material onto which a layer of eucalyptol is spread with a gauze wad three or four times a day. The wad is left spread out on top of the tent.
3. Disinfection of the nasal passages thrice daily with a Marfan syringe filled with 5 per cent. of boric acid and 1 per cent. of resorcinol in glycerin.

4. A daily intramuscular injection of **oleogomenol**: 5 cubic centimeters for a child below 1 year of age, 8 cubic centimeters from 1 to 2 years, 10 cubic centimeters from 2 to 3 years, 15 cubic centimeters from 3 to 5 years, and 20 cubic centimeters above 5 years. If 1 to 2 cubic centimeters of ether are added to the oleogomenol the results are asserted to be still more satisfactory.

5. Administration every three or four days of an emetic based on *ipécacuanha*.

Treatment with tincture of drosera, according to the method of P. Lereboullet. This is a good sedative drug, which is non-toxic.

Large and increasing doses are given: 30 drops for each year of age, with an initial maximum of 100 drops. This twenty-four hour dose is to be divided into three or four fractions. On succeeding days the dose is rapidly increased, by 2 to 4 drops daily, until the initial dose has been trebled; 400 to 600 drops in the twenty-four hours are thus attained. Nurslings are given, as remotely as possible from the feedings, as many drops as the child's age in months, three times daily in a little water. This is increased by 2 drops a day, until 120 drops are being taken daily.

Adrenalin treatment by mouth is likewise a good treatment. The 1:1000 solution is used.

Below three years: 2 drops every three hours.

From three to seven years: 3 drops every three hours.

From seven to fifteen years: 4 drops.

Above fifteen years: 5 drops.

After the first three days, if there is no improvement, each dose is increased by one drop.

The number of drops at a dose is thus persistently increased every four days until there is manifest improvement.

The **expectorants** should constitute the chief form of medication. The antispasmodics must be used guardedly, and the expectorants should predominate in the treatment; in this way the prevention of bronchopneumonia will best be accomplished. The patient may be made to vomit once or twice a week with *ipécac*, or a liquid preparation may be given containing a combination of the antispasmodics and expectorants—syrup of *ipécac*, syrup of *senega*, oxymel of squill, sodium benzoate, etc.

The treatment of the **complications**—bronchopneumonia, epistaxis, convulsions or asphyxia—consists of the usual wholly symptomatic treatment of these conditions or symptoms. For *vomiting*, the child should be given something to eat after the coughing paroxysm, and cold or very hot strong coffee, Seltzer water or Vichy water should be

tried. *Ulcerations of the tongue* should be treated by covering the edges of the teeth with gutta-percha and application of 10 per cent. borax in glycerin, 3.3 per cent. silver nitrate solution or 20 per cent. lactic acid to the ulcers.

Vaccine Treatment (see *Vaccine Therapy*).—Since the discovery of the Bordet-Gengou bacillus, attempts at serum and vaccine treatment have been made by Nicolle, Connor, Blaizot, and others. Some encouraging results have been obtained.

Children in contact with pertussis cases, but showing as yet no symptoms when the treatment was begun, have been protected from the disease by pertussis vaccine.

The majority of the cases treated during the three first days of cough have gone through only a simple whooping-cough.

[According to H. S. Berman, a certain number of the cases will respond favorably to the commercial vaccines; the initial dose should be at least 2 billion *B. pertussis*, to be later increased to 12 billion; in most of his cases the duration of the disease was not much under six weeks. Early treatment is advised.]

Serum Treatment.—R. Debré has injected into children who had lived in prolonged contact with infective cases of whooping-cough the serum from convalescents who had had the disease for four weeks. The greater number remained free of the disease, while the others had only a mild pertussis.

TYPICAL OUTLINE OF TREATMENT OF UNCOMPLICATED WHOOPING-COUGH IN A CHILD OF THREE YEARS.

1. Isolate the patient in a spacious, well-ventilated room.
Change the air at intervals, avoiding drafts.
Admit fresh air continuously if the climate and season permit.
2. Free evaporation of aromatic oils, *e.g.*, of eucalyptus or turpentine, or of benzoin or creosote.
3. Careful antisepsis of:
 - (a) The mouth, by mouth-washing with hydrogen peroxide solution diluted 1:3.
 - (b) The pharynx and nasal passages, by sprays and instillations of petrolatum containing 2 per cent. of resorcinol.

4. R	Tincturæ belladonnæ	1 c.c.	(℥xvj);
	Antipyrinæ	5 grams	(gr. lxxv);
	Potassii bromidi	6 grams	(ʒiiss);
	Syrupi aurantii florum	60 c.c.	(fʒij);
	Aquæ destillatæ .....q. s. ad	240 c.c.	(fʒviiij).

M. Sig.: Four tablespoonfuls in the 24 hours.

5. \mathcal{R} Ipecacuanhæ pulveris 0.3 gram (gr. v);
 Syrupi ipecacuanhæ 24 c.c. (f5vj).—M.

Twice a week, in the morning, on an empty stomach, the patient is to be given this preparation in teaspoonful amounts at five minute intervals until vomiting occurs. After each spoonful, some hot infusion or weak tea should be given.

6. If the child vomits as a result of the paroxysm, the regular meals are to be left off and the child fed after each paroxysm; a demitasse of coffee is to be given in addition to the food.

7. If the coughing spells stop or fever sets in, the physician should be called up immediately.

VENEREAL DISEASES.

(Written with the collaboration of DR. SAINT-CÈNE.)

GONORRHEA AND ITS COMPLICATIONS.

ACUTE GONORRHEA.

A. ABORTIVE TREATMENT.—When a patient seeks medical advice *within a few hours* after infection—which, unfortunately, is rare—there is a good chance of curing him quickly with the abortive treatment.

ARGYROL appears, at the present time, to be the best abortive remedy for acute gonorrhea.

Conditions Necessary for Successful Results.

1. *The treatment must be begun as early as possible* (in six to thirty-six hours after the beginning of the discharge). The reason for this is that the gonococcus must be overcome while the infection is still superficial, before it has penetrated into the urethral glands.

2. **Argyrol** must be used in a *sufficiently concentrated solution* (20 to 25 per cent.) by injection, at least once a day. This injection should be carried out by the physician himself. The other daily injections, carried out by the patient, should be made with a 5 or 10 per cent. solution.

3. Solutions of argyrol should be prepared without the use of heat; the drug must dissolve slowly.

4. It is very important to use only freshly prepared solutions—if necessary, prepared just before use.

Technic.

1. The patient is made to urinate.

2. *Irrigation of the anterior urethra, under very low pressure*, by the Janet gravity method (jar, tube and nozzle), with either 3 per cent. *argyrol* or a 0.15:1000 solution of *mercury oxycyanide*.

(This preliminary irrigation is not indispensable; it is indicated especially when the discharge is copious, to remove the greater part of the pus from the canal. It is better not to perform this irrigation at all than to do it carelessly. The irrigation should be carried out, as it were, *without pressure*, and with an extremely weak antiseptic solution.)

3. *Inject 5 to 7 cubic centimeters of the argyrol solution with a Bonneau syringe* (plungerless syringe with Janet nozzle). The injection of the

20 per cent. argyrol should be carried out *slowly*. The fluid should be kept in contact with the urethra for *exactly five minutes* by pinching the meatus between the thumb and forefinger.

After the injection the fluid is allowed to run out and a large tampon of cotton applied to avoid staining of the clothing.

4. On the first three days, the injection should be repeated *three times*, with the same procedure each time. *If there is too severe a reaction, the strength of the solution is to be reduced.* If the patient is unable to come to the office so many times, he may be allowed to give himself two or three such injections, or similar injections of a 10 per cent. solution, these injections to be carried out after each act of micturition (Janet).

As a rule, about the fourth or fifth day, the desired results should be obtained, the discharge ceasing and the gonococci disappearing. If recovery is delayed or failure appears to be confirmed by increased discharge and persistence of the gonococci, the abortive treatment may be given up and the regular (repressive) treatment of established acute gonorrhea with free potassium permanganate irrigations be resorted to.

B. TREATMENT OF ESTABLISHED ACUTE GONORRHEA.—Where the abortive treatment has failed or its use appears to be contraindicated, the treatment with free urethral and, if necessary, urethrovesical irrigations with potassium permanganate remains the best treatment.

Above all, the following fundamental features should be borne in mind.

Gonorrhea shows a natural tendency toward recovery.

The rôle of the physician is to follow and assist nature.

The purpose of the irrigations is chiefly mechanical evacuation, without trauma, of the germs already dealt with by the phagocytes and of the leukocytes that have accumulated over the mucous membrane.

It is necessary to follow regularly with the microscope the course of the disease and the progress made toward recovery.

The more acute the inflammation, the greater the precautions to be taken by the physician.

In order not to do harm, the irrigations of the urethra must be properly carried out and the treatment must follow certain rules which have been laid down precisely by Janet.

Potassium permanganate remains, on the whole, the best remedy, at least in all the acute and subacute cases. Under certain conditions protargol or argyrol in dilute solution or a weak solution of silver nitrate may be substituted.

The irrigations should at first be confined to the anterior urethra. Only when, on account of clouding of the second glass and evidences of cystitis, involvement of the posterior urethra is believed to have occurred is a free irrigation of the urethra as well as the bladder warranted.

Technic of Anterior Irrigation.—The receptacle for the solution is suspended 1 meter (40 inches) above the level of the patient's chair. A 0.15:1000 solution of potassium permanganate is prepared with boiled water *as hot as can be used* (40 to 45° C.—104 to 113° F.).

The penis is taken in the left hand, and the prepuce carefully drawn back between the middle and ring fingers while the thumb and forefinger are keeping the meatus partly open. The greatest gentleness should be exercised in these maneuvers; the diseased penis must be handled with care if one is to avoid assisting the penetration of the germs into the tissues. Janet recommends the avoidance of traction on the penis, which is a habit of some patients and even physicians.

The nozzle is held by the right hand, or better, the rubber tubing slightly above the nozzle, in order that the flow through the tube may be moderated at will by pressure on the tube.

After external irrigation of the glans and prepuce, the nozzle is held gently against the meatus. It is brought in more or less direct contact with it in accordance with the sensitiveness of the urethral canal and meatus, which is sometimes extremely great. Often, in the earlier irrigations, it is only by projecting the fluid from a distance into the first few centimeters of the urethra that the patient can be made to stand the irrigation. In the ordinary cases in which penetration is possible, the nozzle, placed against the meatus, is made to perform a series of to-and-fro movements which permit of entrance and outflow of the fluid and clearing of the urethra from the meatus up to the vicinity of the bulbous portion. The irrigation should be carried out neither too rapidly nor too slowly; what is to be absolutely avoided is distention of the canal by too abrupt an introduction of fluid.

Technic of Urethrovessical Irrigation.—Irrigation of both the urethra and bladder must not be employed in the acute stage. Very seldom is it justifiable to begin with a complete irrigation; such is the case only where the urethral disease has already existed for several weeks, with attenuation of the inflammation, and one is certain, by virtue of the presence of shreds and pus in the second glass, that the entire urethra is involved. Even in this event, how-

ever, the urethrovesical irrigation should always be preceded by irrigation of the anterior urethra.

Penetration of the liquid into the bladder sometimes takes place very easily when it has once gotten past the sphincter of the bulb. In many instances, such penetration occurs only gradually, after a species of education of the patient.

This process of education generally takes place spontaneously; it is facilitated, however, by directions given to the patient. For this purpose, he should be reassured and confidence imparted to him, and should be directed to breathe deeply, stay perfectly at ease and relax, and not to strain, but to act as if he were already urinating. In this connection, one sometimes succeeds better in having the urine enter the bladder where the patient has not been instructed to urinate before the irrigation. The irrigation of the anterior urethra is begun with the bladder full and, at the moment when it is desired to have the fluid pass into the posterior urethra, the patient is requested to empty his bladder; the sphincter opens slightly and the irrigation fluid passes into the bladder. Gradually the sphincter becomes educated to the procedure, and in two or three days a complete irrigation can be carried out without difficulty.

In cases in which penetration of the fluid cannot be readily effected, it is better to anesthetize the sphincter beforehand with a 1 per cent. solution of procaine or cocaine. Five or six cubic centimeters of the anesthetic solution are injected into the urethra with the Bonneau syringe. The fluid is held in the urethra for a few seconds and, the sphincter reflex being then abolished, penetration of the fluid takes place readily, and often within a few days the anesthetics can be dispensed with.

What Strength of Solution Should be Used in the Irrigations?—

In general, the best results are obtained with weak solutions. At first, when the urine is cloudy and the inflammation is very acute, the irrigation fluid should not exceed a concentration of 0.05 or 0.1: 1000. At this time the antiseptic effect is a secondary matter, the purpose of the irrigation being mainly to cleanse the mucous membrane mechanically of the secretions that have accumulated over it and are interfering with its own defensive activities. It is important, however, particularly in this stage, to use a *solution as warm as the patient can stand*.

Gradually, as the urine clears and the inflammation subsides, the strength of the solutions may be increased up to 0.15, 0.2 or 0.25: 1000, according as the shreds are more or less thick or numerous; the lighter and fewer the shreds, the stronger the solution used. In the

selection of the concentration of the fluid to be employed there enters an element of experience and personal observation; progression will be more or less rapid according to the degrees of sensitiveness of the patient and the extent of reaction on the part of the urethra.

How Many Irrigations a Day?—In the acute stage, there is advantage in carrying out two irrigations (of the anterior urethra) daily. When, after seven or eight days, the pain and inflammation are tending to subside, while the strength of the solution used is slightly increased, the irrigations are reduced in number to one a day.

How Long Should the Irrigations be Continued?—In general, they should be kept up for a rather long time—about three weeks or a month.

The daily irrigations are to be continued until the gonococcus has disappeared from the discharge and the shreds.

It is necessary, however, to know when to stop the irrigations, and not continue them too long. When the discharge is reduced to an oozing of serum and there remain only a few light, mucous, flaky shreds, there is advantage in discontinuing the injections and giving the urethra rest.

If necessary, they may be continued every two or three days and the patient held under observation.

If the discharge reappears, the irrigations should be resumed; if it does not, after a few days of observation, the beer test, or the silver nitrate test, or the intercourse test (with a condom) may be tried.

If no reaction occurs and the urethra remains dry, recovery may be considered as having taken place, although observation should continue.

What is to be Done in Case of Persistence of the Discharge?—A mere change in the strength of the solution, whether the latter be weakened or made stronger, is sometimes sufficient to bring about recovery from the urethritis. Where, as is frequently the case, the persistence of the discharge is due to an associated infection, which is revealed by the microscope, the permanganate may either be discontinued completely and replaced by another antiseptic, or be combined with weak mercury oxycyanide (0.15 to 0.25:1000).

But if, after prolonged treatment, there is still a pure gonococcal infection in the discharge, there is present, in all likelihood, some focus of bacterial infection acting as a nidus for gonococci, which must be looked for and discovered.

Janet has particularly well described and thrown much light on these foci.

Sometimes there are *congenital niduses* consisting of diverticular recesses from the lips of the meatus, or a malformation of the meatus, or a para-urethral channel in a case of hypospadias, or a band at the fossa navicularis; at other times there are *accidental niduses*, *e.g.*, abscess of the frenum or of the glans or urethral glands, or inflammation of Littre's or Cowper's glands. Direct treatment of these foci in many cases puts an end to a persistent urethritis.

Detection and treatment of these foci are greatly facilitated by the use of the small three-branched urethral speculum and the platinum stylet of Janet; if required, urethroscopy should be availed of to assist in the incision or galvanic or electrolytic cauterization of the morbid condition found.

Medical Treatment.—The medical treatment is a useful adjunct to the local measures, but consists chiefly in instructing the patient in certain general hygienic rules. In conjunction with the irrigations, the patient should be advised to drink plenty of water and avoid alcoholic beverages and sexual excitement. Great care should be taken not to prescribe the balsamics from the start, as their early administration is often the best way to keep up the discharge indefinitely.

The wearing of a suspensory, while generally advised, is not to be recommended. It is of no value to prevent the appearance of an orchio-epididymitis; in fact, it would rather favor it by promoting retention of the purulent secretions in the region of the bulb through the pressure exerted on the urethra by the lower margin of the opening through which the penis passes.

Some symptoms may be combatted with drugs, *e.g.*, the terminal serous discharge by oil of santal or other balsamics, or methylene blue, and the pain and nocturnal erections by bromides, warm tub baths, and hot or very cold moist packs.

TREATMENT OF PRIMARY ACUTE OR SUBACUTE NON-GONOCOCCIC URETHRITIS.

The normal urethra has great powers of resistance to bacteria other than the gonococcus. It would be a mistake, however, to think that all cases of primary acute or subacute urethritis are of gonococcal origin. The microscope, constituting an indispensable auxiliary to every physician who takes up seriously the treatment of urethritis, permits of differentiation of the several forms of urethral inflammation.

Ordinary non-gonococcal urethritis has for its cause an attenuated infection of the canal by varying germs, of which a simple leucorrhea in a woman may be the source.

The pus is generally not so thick nor of such a consistency as gonorrheal pus and the inflammatory manifestations are generally lacking.

The treatment should be cautious. A few irrigations with 1:4000 mercury oxycyanide, with aniodol or even with weak potassium permanganate will generally cure the condition.

Especial care should be taken not to transform this ordinary and generally mild urethritis by excessive treatment into a persistent chronic urethritis.

Chemical urethritis, brought on by inopportune measures, by overactive, supposedly "curative" injections, and frequently by injections employed for *prophylactic* purposes (one might even set apart a *prophylactic urethritis*), is deserving of attention if one wishes to avoid making the urethral lesions worse.

The treatment consists of rest and abstention from all local medication—or at most, very cautiously, a few injections of sterile oil of sweet almonds with or without zinc oxide, or Janet's urethral pencils of zinc oxide and sodium borate, may be used.

Mention should also be made of *urethritis of toxic origin (ab ingestis)*, of *diathetic urethritis* (phosphaturia, gout), and of the *urethritis* coming on in the course of *infectious diseases*, which one should be able to recognize, particularly in order not to inflict any useless or dangerous local treatment.

Syphilitic Urethritis and Chancroid.—Whenever an acute urethritis exhibits unusual features, *e.g.*, a seropurulent discharge, sometimes bloody, copious and thin, with swelling of the meatus, uneasiness or pain in the urethra and inguinal adenitis, the possibility of *syphilitic urethritis* should be thought of. This condition is relatively common and is generally overlooked. It is actually due to the presence of a chancre or mucous patches in the urethra. Sometimes it is possible to see the chancre forming a more or less distinct indurated area at some point along the canal (usually but a short distance from the meatus). What is to be looked for particularly in such cases, however, is the spirochete in the discharge.

If necessary, the examination should be repeated two or three times. It will permit of making a rapid, early diagnosis of syphilis and obviate useless local treatment.

It may happen that microscopic examination of the discharge reveals the bacillus of Ducrey, alone or in conjunction with the syphil-

itic spirochete or even the gonococcus. In the presence of *chancroidal urethritis* (due to Ducrey's bacillus), hot irrigations and injections of iodoform in oil are indicated.

A mere allusion will be made to **tuberculous urethritis**, a relatively rare condition which appears rather as a manifestation of genito-urinary tuberculosis than as a true primary urethritis.

TREATMENT OF COMPLICATIONS.

I. Hyperacute Gonorrhea.—This is characterized by intense pain in the urethra; the penis is swollen and painful; the meatus is red and turgid, with pouting margins; the prepuce is tense, red and sometimes streaked with lymphangitis; the inguinal glands are sensitive and painful; frequently, too, the general condition is poor, with fever and sleeplessness.

The treatment should, in the first place, be cautious and calculated to allay inflammation. Irrigations should by no means be employed, and special care should be taken not to traumatize the mucous membrane. At the most, with a pressure of but a few centimeters, should the glans, meatus and first few centimeters of the balanic urethra be washed by directing a very weak stream into the canal from a distance. As the inflammatory manifestations become less, a more complete irrigation may be carried out, although always very gently, resulting in a very light, very superficial clearing out of the canal.

On the other hand, much stress should be laid on rest, tub baths, and the taking of water and diuretic decoctions. If required, opiates should be employed. At night the penis should be covered with a wet dressing of cold or hot compresses. It is particularly in these cases that vaccine treatment may be indicated.

II. Urethrocystitis, Urethroprostatitis and Cystitis at the Neck.—The treatment should consist, above all, of rest, copious ingestion of diuretic beverages, warm tub baths, warm enemas and the balsamics, alone or in combination with the internal urinary antiseptics.

Sedative suppositories may be useful to relieve the pain.

Locally, with great caution and very slowly, light irrigations, with or without a catheter, or sometimes a cautious instillation of 5 to 10 per cent. argyrol may be tried in some cases. The liquid should be introduced with the utmost gentleness and allowed to dribble, as it were, from the injection tube so that it will pass without any pressure into the posterior urethra or the neck of the bladder.

III. Acute Prostatitis.—This condition frequently follows poorly conducted irrigations. It may be limited to one portion, of varying ex-

tent, of the prostate or, on the other hand, run a more serious course and lead to a prostatic abscess.

In many cases it is possible and even advisable to continue the irrigations. To these, however, should be added all the measures mentioned under the preceding heading. I particularly recommend the use of small enemas, to be taken as hot as possible and retained.

Where there is suppuration, very gentle expression of the prostate may be indicated; but if the fever, pain and poor general condition persist, surgical intervention may become necessary.

IV. Epididymitis.—Epididymo-Orchitis.—Infection of the testicle remains confined, in the majority of cases, to the excretory duct and the epididymis. That it is always due to penetration of germs into the vas deferens is not certain, and Janet tends to regard it in many cases as a *perideferential lymphangitis*.

Rest, the wearing of a good suspensory lined with cotton, and applications of sedative liniments are the chief measures indicated. Generally it will be found advantageous, as recommended by Janet and Paul Delbet, to continue the urethral irrigations with weak solutions.

V. Seminal Vesiculitis.—Whereas American observers regard this complication as very frequent, Janet deems it rather uncommon and warns against the possibility of error in confounding it with simple vesicular retention due to continence.

Nevertheless, the part that a chronically infected seminal vesicle may take in recurring epididymitis and in relapsing urethritis appears to me a real one, and it is important to know about it.

Generally, cautious massage, hot enemas and copious irrigations suffice in the treatment. The American observers think highly of certain supplementary minor operations, such as Belfield's lavage of the vesicles by drainage of the vas deferens.

VI. Complications Involving the Urinary Tract.—Aside from cystitis at the neck of the bladder, actual *infections of the bladder* due to the gonococcus or associated germs may be observed in the course of gonorrhea. Medical treatment with methenamine and washing of the bladder through the catheter is especially indicated.

Ascending pyelonephritis is rather rare. In its acute stage, one should resort particularly to the continuous use of methenamine or of vaccine therapy; in the stage of decline, when the inflammation has been arrested, lavage of the renal pelvis through the ureteral catheter may be availed of.

VII. General Complications.—These result from the passage of the gonococcus or its toxins into the general circulation, and may be

manifested in the form of a more or less grave septicemia or of involvements of various separate structures (rheumatism, endocarditis, pleurisy, etc.).

Rheumatism is the commonest of these complications.

At whatever point the gonococcal infection is located, disinfection of the urethra remains the fundamental feature of the treatment and should be vigorously sought.

The complication itself, however, demands suitable treatment: Rest in bed, immobilization in a plaster dressing, puncture in hydrarthrosis, hot applications for rheumatism, etc.

CHRONIC URETHRITIS.

Acute gonorrhea, when improperly treated or untreated, passes into chronic urethritis.

In order properly to care for a chronic urethritis, its pathogenesis and the causes of its almost indefinite persistence must be understood.

The changes that take place in the urethra as a result of the acute inflammations may be summed up as follows:

(a) **Transformation of the epithelium**, which becomes keratinized and, from having been a single layer, develops several layers. Actual callous areas form on the surface of the mucous membrane.

(b) **Glandular lesions** involving especially the glands of Littre, which sometimes become the seat of fibrosis, at other times remain as small suppurating cysts, the discharges from which are expelled into the urethra in the form of shreds or may lead to a suppuration capable of reawakening the inflammation of the urethral mucosa and causing the discharge to reappear.

(c) **Lesions in the Posterior Urethra.**—These include inflammation and distortion of the verumontanum, conditions which form the starting point of genital disturbances consequent upon chronic urethritis and the end-result of which is *sexual neurasthenia*.

It is important to bear in mind that while there are many cases of chronic urethritis calling for treatment, either on account of the persistence of the gonococci or secondary infections or on account of the existence of actual lesions leading to repeated recrudescences, there are others which are characterized mainly by serous or seromucous discharges which should not be stirred up too much and which are oftener kept up than cured by the repetition of treatments.

We are here faced by two apparently contradictory clinical facts. One is the innocuous nature of certain torpid, slight discharges,

which treatment does not improve and sometimes only aggravates; the other, the disturbing, equally certain and equally important observation of *latent gonococcus infection*, in which there is seen to reappear a discharge containing gonococci, although the patient had not seen the least discharge for years.

In some instances this recurrence of discharge can possibly be attributed to a reinfection; reinfection may occur even with a woman apparently absolutely healthy, but who herself may have retained within her urethro-uterine glands *latent gonococci*, with which she lives without any apparent harm, and against which she may even become immune, but which, because of excesses, unusual fatigue or other reasons more or less obvious, may become again temporarily virulent towards some one else.

Aside from these cases of *latent gonococcus infection in a woman*, who is capable of reinfected a man with whom she may have been cohabiting for years without harm, there are other cases in which the man himself harbors for years gonococci apparently non-virulent and not even causing any discharge, yet in which these gonococci may suddenly become active again, regain their virulence, and give rise to a purulent discharge.

The social importance of these definitely observed facts is readily understood, and the knowledge of them necessitates great caution both in talking to the infected parties and in the line of conduct to be followed in the case of a patient with a chronic and apparently harmless discharge.

Sperm culture, advocated of late by Guépin, Barbeillon, Noguès and Durupt, and others, permits of discovering a certain number of these cases of *latent gonococcus infection*, and the best adjunct measure in these refractory and inveterate cases is *autogenous vaccine* treatment, persisted in for a sufficiently long time.

ANTIGONOCOCCIC VACCINE THERAPY.

The future of the treatment of gonorrhea, and even more so of its complications, seems bound up with the vaccines. Important progress along these lines has been made in late years, and many are the vaccines recommended.

Among the stock vaccines I have been particularly impressed with the antigenococcic vaccine of the Institut Pasteur, with Bruschetti's Italian vaccine, and with eucratol, an antigenococcic vaccine which contains no gonococci. The Bruschetti vaccine prepared in France (Fournier) has the advantage of not causing shock; eucratol, on the

other hand, as also the Institut Pasteur vaccine, often cause constitutional reactions, which are sometimes severe (high fever, malaise, backache).

The different vaccines give only indifferent results in acute urethritis; they are indicated rather towards the close of the disease, and still more in the various complications, where their use is obviously useful.

In *chronic urethritis*, vaccine therapy, to be effectual, should be poly-bacterial, and it is partly for this reason that the results from *autogenous vaccines* are far superior to those from *stock vaccines*.

Autogenous vaccines should be prepared with aseptically collected urethral secretions and with cultures from the semen. Here one should emphasize that the gonococcus is a *genital* tract organism, and not a urinary germ, and that the habitat of the ambushed and latent gonococcus is the spermatic tract.

Culture of the semen permits of discovering the presence of the gonococcus in it.

An autogenous vaccine can be satisfactorily prepared only in a good laboratory.

The main features of the treatment may be summed up as follows:

For the acute or subacute attacks and for recurrences of urethritis with or without a discharge, copious irrigations with weak antiseptic solutions (weak permanganate or mercury oxycyanide) or with astringents such as copper or zinc sulphate (singly or in combination) in weak solution (1:1000) or with resorcinol (1:1000) should be employed.

When the acute attack has subsided, mechanical treatment may be resorted to, its chief steps being as follows:

1. *Examination for infected accessory channels or urethral diverticula* that might be keeping up the discharge, and their destruction with the galvanocautery. Urethroscopy is capable of giving great service in this connection.

2. *Evacuation of the infected glands of Littre*, either by massage of the urethra over a curved catheter or by dilatation and irrigation with the Jeanbrau or Kollmann instrument.

3. *Softening of the urethral canal by dilatation.*

4. *Disinfection of foci of suppuration* and infected cavities may be attempted, either by direct cauterization with the aid of urethroscopy or by drug instillations and applications.

5. For the *lesions of the verumontanum*, urethroscopy permits of treatment of the mucous membrane with the high frequency spark or the

direct application of medicinal agents calculated to improve certain chronic local conditions.

6. *Endourethral diathermy* by diffusion is of great service, but requires costly equipment.

GONORRHEA IN THE FEMALE.

Gonorrhea in women may involve exclusively the urethra or, on the other hand, remain solely vaginal or cervico-uterine.

Acute Urethral Gonorrhea.—The red, vegetating appearance of the meatus and the characteristic discharge through the urethra, with the finding of gonococci, make the diagnosis easy.

In the less acute cases, an indispensable procedure is to gently express the urethra from the vagina, in order to bring out any purulent secretion to the meatus.

Above all, however, the examination should be carefully directed to the diverticula of the meatus and the orifices of Bartholin's glands and Skene's glands, participation of which in the discharge is the rule and within which the gonococcus lurks sometimes indefinitely.

The treatment of acute gonorrhea in women may include, as in the male, instillations of concentrated argyrol (20 per cent.) into the interior of the canal, or the method of copious irrigation with potassium permanganate.

These irrigations can in very many cases be easily carried out by gravity from a suspended receptacle or, in a few cases, by means of a large bladder syringe with a rubber guard slipped over its nozzle. By following out this procedure the fluid can be injected directly into the bladder.

One might also, after irrigation of the urethra, introduce a No. 14 or 15 Nélaton catheter into the bladder and fill the latter with a solution of potassium permanganate, to be voided by the patient immediately after.

Skene's glands and the various vulvar foci should not be forgotten.

The best plan is to inject through the orifices of the ducts of these glands, into the interior of the latter, a few drops of the argyrol solution by means of a fine needle with its point cut off.

Vaginal and Cervico-uterine Gonorrhea.—Independently of the injections, the local treatment may be outlined thus:

1. Insertion of the speculum. With a small pledget of cotton, light and brief application of a 20 per cent. solution of argyrol in the cavity of the cervix.

2. Introduction into the vagina of a wick of gauze more or less completely impregnated with 20 per cent. argyrol. This gauze is to be left in place a sufficient length of time (three or four hours).

If the infection is confined to the cervix, the gauze need be impregnated with argyrol only in its cervical portion; attention should, however, be carefully paid to the fact that in many instances, when there is uterine retroversion, the gauze tends to lodge itself in the posterior cul-de-sac. Actual application of the medicinal agent to the cervix will be wholly uncertain if the precaution is not taken beforehand of filling the cul-de-sac with an initial tampon.

When the infection involves the vagina, the gauze should be moistened with argyrol for a greater portion of its length so as to treat the vagina in addition. Care should be taken to protect the clothing by means of a large wad of cotton.

Antiseptic ointments are convenient to use for vulvovaginitis.

The best are those of collargol (20 per cent.) or argyrol (20 per cent.).

VULVOVAGINITIS IN CHILDREN.

The vulvovaginitis of children may be considered in most instances as the result of an attenuated gonococcal infection. The frequent complications met with in women (urethritis, urethrocystitis, metritis and salpingitis) are rarely observed in children; at the most, sometimes, some degree of cervical metritis may be observed.

Prophylaxis.—The child must sleep alone. She should not be permitted to use the beds of the adult members of the family. The parents should be instructed as regards the hygienic care of the genital region. The wearing of closed underdrawers by the child should be advised.

Treatment.—This is often difficult to apply; it calls for expertness and gentleness on the part of the physician.

If the disease is strictly confined to the vulva, repeated antiseptic washings or applications of 20 per cent. argyrol solution, or better, of ointments (argyrol or collargol, 20 per cent.), may suffice.

If vaginitis is present, recourse should be had, whenever the condition of the hymen permits, to vaginal irrigations, which can, as a rule, be easily carried out with a small Nélaton catheter, through which fluid is passed by gravity or with a syringe. A better procedure is to administer vaginal instillations through a very narrow catheter or a special instillation syringe, the latter being, if necessary, directly applied to the external orifice.

Vulvar erosions should be treated by the application of a 2 or 3 per cent. solution of silver nitrate or by dusting them with zinc peroxide.

PROPHYLAXIS OF GONORRHEA.

In the Male.—*Before any suspicious coitus*, it is well to have recourse to the condom or at least to cover the glans and meatus with a thick layer of antiseptic petrolatum.

After intercourse, it is well:

1. To urinate.
2. To wash the penis and the meatal orifice carefully with soap and water.
3. Within the succeeding few hours, as soon as possible, to adopt certain antiseptic precautions. In this, however, it is necessary to remember the adage: *Primo non nocere*. The prophylactic injection should be made very slowly, should penetrate only a short distance into the canal, and should be carried out with a fluid devoid of caustic properties.

Argyrol is very serviceable in the form recommended by Janet, *viz.*, a mixture of 2 parts by weight each of argyrol and glycerin and 8 parts of boiled distilled water.

With a syringe sterilized by boiling (Bonneau's syringe with a Janet nozzle, or, if not available, an ordinary glass Luer syringe), 3 or 4 drops of this solution are so injected as to reach the fossa navicularis. The same solution is then painted over and about the frenum, in the coronary sulcus and over the whole glans.

In the Female.—After intercourse, the woman urinates, then carefully cleanses the vulva and vagina. A tampon of argyrol is applied over the meatus and Bartholin's glands, and a vaginal injection carried out. Lastly, if a physician's services are obtainable, he should complete the disinfection with an application to the cervix and its lumen by means of cotton dipped in a strong (10 to 20 per cent.) solution of argyrol.

CHANCROID.

Before any treatment, i.e., before any ointment or caustic is applied over what is taken to be a soft chancre, a microscopic examination should be made. One should bear in mind the possibility of a mixed chancre in which the spirochete of syphilis is present along with the bacillus of Ducrey—a combination much more frequent than is generally supposed. The microscopic examination can alone give definite information on this point.

I. TREATMENT OF THE SOFT CHANCRE.

I. Treatment by Heat.—The best and simplest of the remedies is *heat*. The bacillus of Ducrey cannot withstand a temperature of 45 or 50° C. (113 to 122° F.). The heat may be applied in different ways:

(a) *Radiated heat*.—The chancroid having been carefully dried, a thermocautery blade heated to a bright red is brought to within 3 or 4 millimeters ($\frac{1}{8}$ or $\frac{1}{6}$ inch) of its surface. This treatment is easy to apply and is really effective. A daily treatment lasting two or three minutes should be given. This procedure must not be confused with direct application of the cautery to the lesion—an utterly faulty procedure, which would lead to much scarring and possibly conceal a mixed chancre.

After each sitting the chancroid should be dusted with iodoform, zinc peroxide, calomel, thymol iodide, etc.

(b) A stream of hot air may likewise be resorted to.

II. Treatment with Caustics.

1. Phenol in 10 per cent. alcoholic solution. The treatment should be preceded by an anesthetizing application of Bonain's fluid:

℞ Phenolis,
Mentholis,
Cocainæāā 1 gram (gr. xv).—M.

2. Zinc chloride in 10 per cent. solution. In some severe cases with phagedena, I found the direct application of a pure zinc chloride pencil of value. A scab forms and separates in three or four days, after which very rapid healing follows.

When the cauterizations appear to have acted sufficiently, they should be replaced by a simple antiseptic powder and allowed to heal.

There are rather many cases in which soft chancre proves particularly obstinate; under these circumstances it is well to vary the treatment.

The *spraying of Mencièrè's fluid* on the chancroid constitutes an excellent treatment. Following is the formula, as modified by Barthélemy:

℞ Iodoformi 5 grams (gr. lxxv);
Eucalyptolis 1 gram (ᵐ xvij);
Guaiacolis 1 gram (ᵐ xv);
Alcoholis 12 c.c. (f3iij);
Ætheris 140 c.c. (f3v).—M.

Goubeau's treatment with *sodium arsenate* is remarkably effective. It is applied as follows:

1. The chancroid is first washed with ether, or better, with carbon tetrachloride. The cleansing should be very carefully done, care

being taken to introduce the drug with cotton on an applicator into all recesses of the lesion.

2. Application of:

R. Sodii arsenatis 1 gram (gr. xv);
 Alcoholis 60 c.c. (f3ij).

M. Sig.: Shake before using.

3. After the fluid has been painted on once, a stream of air from the rubber bulb of a thermocautery is directed over the chancroid to evaporate the alcohol.

4. The same application is repeated once or twice, and the lesion then dried and dusted with an antiseptic powder.

II. TREATMENT OF THE BUBO.

As long as there is no fluctuation, spontaneous recovery may take place under rest and the treatment of the soft chancre.

When fluctuation has appeared, recourse is generally had to puncture of the bubo followed by injections of antiseptics, *e.g.*, 1:10 iodoform in petrolatum, Menci re's fluid, or 1:50 alcoholic sodium arsenate solution.

Technic.—The abscess is entered with a fine trocar and thoroughly emptied. Through the trocar, left *in situ*, there is then injected with a sterile glass syringe a sufficient amount of the medicated fluid to fill and even slightly distend the cavity.

If the bubo has opened spontaneously, disinfection of its cavity with the same drugs may still be availed of; but if recovery should then be slow, it would be better to resort to surgical excision through a wide incision, with d bridement of the whole glandular mass with the finger and its removal *en bloc*.

SYPHILIS.

GENERAL CONSIDERATIONS.

Every physician should be thoroughly imbued with the following propositions:

1. In syphilis diagnosed in the primary stage and treated energetically for a considerable period, the chances of a cure are good.

2. Syphilis in any stage, vigorously, treated, may retrocede and remain mild.

3. In nervous syphilis, including the disorders formerly termed parasyphilitic (tabes and general paralysis), the chances of response to the treatment are the greater according as the diagnosis is made earlier and the specific treatment more actively pushed.

Consequently, great importance attaches to the patient's first visit.

The individual who shows a tendency to make light of the disease when told that he is infected with it must be shown the seriousness of his condition and the risks entailed both to himself, his relatives and his associates.

Those—and they form the majority—whose reaction to the announcement might be excessive should be told the truth only gradually, by stages, the physician resorting to complementary examinations as subterfuges in order to close the door only gradually to the hope of a harmless infection or a possible mistake in diagnosis. The patient's mind will thus be led slowly toward the trying road of minor hopes and prolonged treatments. He should then be reassured by showing him the possibility of practically complete recovery, only at the cost, however, of marked persistency and inexhaustible patience, though usually with little actual discomfort. He should be taught that syphilis, when correctly treated, remains a relatively mild disease, requiring neither interruption of his work nor noteworthy changes in his habits and that, on the whole, if he wills it, his life need differ but little from a normal life.

In short, after this first visit the patient must have a clear and exact conception of the disease from which he is suffering and be able to face the truth as a man who has resolved to take proper care of himself. He should neither be too completely reassured nor uselessly thrown into a panic.

THE NEED OF AN EXACT AND EARLY DIAGNOSIS.—

Nothing can be more serious than to tell a patient he has syphilis. Bound up with this announcement are the health and sometimes the life of the patient, and to some extent the physician's own honor.

To overlook syphilis is to expose the patient to all the calamities of unrecognized syphilis; it makes of him a menace to society, and he is left at the mercy of the worst of complications.

To diagnose syphilis when it does not exist is no less serious a proceeding.

It risks making of the individual one of those neurasthenic syphilophobes whose lives are embittered by a hasty and mistaken diagnosis.

At the present time it is nearly always *possible to impart strict accuracy to the diagnosis. In the case of a primary lesion, this diagnosis may be made extremely early* (see further on).

The first prerequisite is that, where syphilis is concerned, *the disease must always be thought of.*

It would be out of place here to go into a detailed description of the lesions of syphilis; but whether one is concerned with an ulcer

on the genitals, a skin eruption or an ill-defined visceral disturbance, syphilis must be kept in mind.

Direct Detection of the Spirochete.—Of all the laboratory methods that permit of a definite statement as to the existence of syphilis, the most decisive is unquestionably the visual detection of the spirochete in the actual lesions shown by the patients.

To any physician who has some familiarity with laboratory procedures, the detection of the spirochete is generally an easy matter. But where the physician does not have the necessary equipment or where time or training are lacking, it is always easy for him to send his patient to a reliable laboratory where the direct examination, made at once, will sometimes give him the required definite answer* (in the positive cases, of course—a negative result never having more than a relative value and demanding further examinations).

The direct examination is useful even in secondary lesions (papular or ulcerative syphilides), but is especially valuable at the onset of the hard chancre, when a clinical diagnosis is almost impossible and there may be doubt between a herpetic lesion, a soft chancre and a hard chancre.

At the beginning of the chancre and throughout its duration, the advantage of the direct examination is a capital one, and such examinations should be made an absolute rule. Surprising results can thus be obtained; not rarely are we able to diagnose a syphilitic chancre on the third day; a soft chancre may be detected very early. One is struck, in the course of such examinations, by the frequency of *mixed chancres*.

Early diagnosis and vigorous treatment almost implies a certain cure.

The Bordet-Gengou-Wassermann-Vernes Reactions.—In secondary or tertiary syphilis, and in visceral or nervous syphilis, definite confirmation of the diagnosis of syphilis is procured with these reactions (see "*Clinical Diagnosis*").

It should be borne in mind that these tests become positive only about thirty to forty days after the start of the infection. The serum reaction is an important diagnostic factor, the value of which is admitted by practically all observers. It should be regarded, as it were, as a symptom, often the only appreciable symptom, of the disease in its latent state, and the treatment has for its purpose, as much as possible, the *permanent* disappearance of this symptom. Strongly positive toward the end of the primary stage and during the secondary

* Without mentioning the advantage that there may be, alike for the physician and his patient, in beginning the treatment with a species of official document that may later be of service in avoiding unfortunate disagreements.

stage, it becomes attenuated and then disappears completely under the influence of treatment. This disappearance may be only temporary; a negative reaction assumes real value only if it remains such.

The term *reactivation* refers to a control procedure which may be described thus: In a subject whose blood gives a negative reaction, upon giving an arsenical injection (0.3 gram of neoarsphenamin) the reaction may again become positive a week or two later. This question is, however, still the subject of much discussion, as positive Wassermann reactions have been observed after arsenical injections in persons free of syphilis.

In some cases, it is necessary to push the inquiry further and apply the Wassermann-Vernes reaction to the cerebrospinal fluid.

It is very interesting to follow on a chart (see "*Clinical Diagnosis*," 3d American Edition) the variations in a patient's serum reaction, remembering that only a succession of negative results at intervals of several months justifies considering that recovery has probably occurred.

THE APPLICATION OF ANTISYPHILITIC TREATMENT.

Until about 1906, antisyphilitic medication was based on little else than mercury and the iodides. It underwent a complete transformation with the introduction of the *arsenical compounds* (1908) and later the discovery of the parasiticial properties of *bismuth* (1919-1920).

The course of the disease, and its prognosis, into which has now been injected the element of hope for complete eradication of it in the initial stage of its manifestations, have been favorably influenced as a result of this transformation.

I.—MERCURIAL MEDICATION.

While mercury no longer holds first place, it has retained numerous steadfast advocates; its curative action, confirmed by century-long experience, is certain, and alone, may it be said, does mercury now appear to have proven its worth in the prevention of tertiary syphilis.

Mercury may be given by intramuscular or intravenous injection, by inunction, in suppositories or by the mouth (see Part I: *Mercury*, for the pharmacology of mercury and its compounds).

At this point mention will be made merely of the mercurial preparations which we deem the best to use.

A. Intravenous injections of mercury cyanide exert a particularly powerful and rapid action. They are indicated, alone or in conjunction with the arsenicals, in cases in which a vigorous, rapid effect is desired, in young subjects in a condition to stand active measures.

The essential plan is to inject 0.01 gram ($\frac{1}{10}$ grain) of mercury cyanide a day for twenty to twenty-five days. It is well, however, not to use a 1 per cent. solution, but to dilute the drug further, or to have prepared ampules each containing 0.1 gram in 2 cubic centimeters of water. *The injection should be made very slowly*, and great care should be taken to make sure that the needle is actually in the vein, as the least droplet of mercury cyanide outside of the vessel or in its wall may cause sharp pain, induration or painful necroses (hence the utility of the diluted solutions).

It may happen that the treatment cannot be continued to its conclusion: It may have to be stopped on account of intolerance of the drug, manifested in bloody diarrhea (enteritis) and very painful colicky pains simulating lead colic (periumbilical pains, retraction of the abdomen, obstinate constipation). The use of the drug should be carefully supervised. It is well to prescribe at the same time an opium preparation, and, if need be, the treatment should be interrupted at the least sign of trouble.

B. Intramuscular injections of gray oil appear to us to constitute one of the best and simplest means of administering mercury.

They present the following advantages:

1. Powerful action.
2. Relatively easy technic.
3. Relative painlessness.
4. Low expense.

The injection is made in the buttock, on its outer aspect, either in the upper portion of the buttock or its outer and lower fourth. Care should be taken to use always a high grade, specially prepared oil; gray oil is a delicate preparation. When a well-prepared gray oil is compared under the microscope with an insufficiently triturated and uneven oil, a marked difference is seen; the well-prepared oil consists of a suspension of particles of equal and very small size, whereas a poor oil is made up of flakes of irregular size and varying thickness. A 40 per cent. gray oil is generally used. The injection is administered with special syringes so graduated that each division represents 0.01 gram of mercury.

It is well not to use platinum needles. The mercury that remains in the needle after each injection produces a series of holes in the needle, and when the injection is given the mercury flows out in all directions and all along the channel made by the needle in the muscle tissue. The procedure of passing the needle through a flame is likewise faulty: It results in the penetration along with the fluid of small masses of carbonized oil which act as foreign bodies and facili-

tate the production of abscesses. The best plan appears to us to use needles of steel or nickel; to clean the needle with a little alcohol, then keep it in alcohol and boil it before making an injection. With these precautions there will never be produced any of those abscesses, generally aseptic, but running a particularly slow course, which have been found the greatest drawback in the use of gray oil injections.

As injections of gray oil have to be given deeply into the muscles, needles 6 to 8 centimeters ($2\frac{2}{5}$ to $3\frac{1}{5}$ inches) long and of small caliber should be used. The needle should first be introduced into the tissues alone, and the syringe connected with it and the injection made only after making sure that no blood is coming out through the needle.

Gray oil is generally prescribed in courses of four to six injections, each injection consisting of 0.06 to 0.08 or even 0.1 gram (1 to $1\frac{1}{2}$ grains) of mercury, according to the patient's condition of health and body weight.

The interval between injections should be from eight to ten days.

The condition of the kidneys and mouth should be carefully watched, with a view to stopping the treatment at the least evidence of trouble.

C. Intramuscular injections of soluble salts, although widely recommended, have the disadvantage of being painful and borne only with difficulty by some patients. Again, a course of treatment, to be effective, requires a rather large number of injections, *viz.*, from 20 to 30 or 35, which is rather annoying and inconvenient.

Mercury cyanide (0.005 to 0.01 gram— $\frac{1}{12}$ to $\frac{1}{6}$ grain—per cubic centimeter—16 minims) is one of the most active salts; such injections have the disadvantage, however, in common with intravenous injections of the same salt, of sometimes giving rise to painful and bloody diarrhea necessitating suspension of the treatment.

Mercury biniodide in aqueous solution is generally well borne and causes little pain. It is given in courses of twelve to fifteen injections, daily or on alternate days, according to Emery's formula:

℞ Hydrargyri iodidi rubri,			
Sodii iodidi	āā	0.5	gram (gr. viiss);
Sodii phosphatis (neutri)	1		gram (gr. xv);
Sodii chloridi		0.35	gram (gr. vss);
Aquæ destillatæ sterilisatæ	q. s. ad 50	c.c.	(f3xiiij).—S.

[1 c.c. = 0.01 gram of biniodide.]

The biniodide in oily solution is no longer much used.

Enesol (mercury salicylarsenate) is a good preparation recommended by some observers.

Mercury benzoate has been recommended by Gaucher, who uses the following formula:

℞ Hydrargyri benzoatis	1 gram (gr. xv);
Sodii chloridi (C. P.)	2.5 grams (gr. xxxviii);
Aquæ destillatæ sterilisatæ .....q. s. ad 100	c.c. (℥iiss).—S.
[1 c.c. = 0.01 gram of benzoate = 0.0045 gram of mercury.]	

The benzoate solution is prescribed in doses of 1 to 2 cubic centimeters (16 to 32 minims), in courses of twenty to twenty-five daily injections. It is generally well borne and seldom gives rise to any of the mercurial symptoms.

[*Mercury salicylate* is official in the United States, and is recommended by Cole, who found it completely absorbed from the gluteal muscles in an average of four days.—TR.]

To make these various forms of intramuscular injections less painful, numerous preparations combining cocaine, stovaine, procaine (especially with the cyanide) have been placed on the market. Saccharose has been combined with the benzoate and biniodide, and certain saline solutions have been used in order to make the preparation injected iso- or hypertonic.

D. **Suppositories of mercury** appear to us an excellent mode of administration. The procedure is easy, effective and inexpensive. The suppositories prescribed should contain 0.05 to 0.08 gram ($\frac{3}{4}$ to $1\frac{1}{4}$ grains) of mercurial ointment in 3 grams (45 grains) of cacao butter, and are to be used in courses of ten or twelve, daily or on alternate days. An interval equal to the period covered by the course should be allowed between successive courses.

E. **Mercurial inunction**, formerly so widely used, still remains a good method of introducing mercury into the system. It constitutes an active, potent procedure the value of which has been sustained by prolonged experience. It has the advantage of sparing the digestive tract and is especially indicated in patients who do not tolerate injections well.

The following precautions should be taken:

(a) The exact amount of mercury (in the form of mercurial ointment) to be used at each inunction should be specified on the prescription:

℞ Unguenti hydrargyri fortioris 3-5 grams (gr. xlv-lxxv).
 Ponē in chart. cerat. No. viii-x.
 Sig.: Use one daily as directed.

(b) The inunction should be carried out slowly, for a sufficiently long time (twenty minutes) to insure proper penetration of the drug, and preferably in the evening.

(c) The site of inunction should be changed each day.

As a general rule, from fifteen to twenty inunctions should be ordered; the patient should be watched, and if necessary, the frequency of the inunctions may be reduced to two or three a week.

Inunctions really do not constitute anything more than an exceptional or temporary treatment; they are likely to be reserved for certain special cases in which either a rapid and energetic action is needed, or the digestive tract has to be spared in a patient who does not stand injections well, or the case is one of infantile or congenital syphilis in which the taking of the drug by the mouth is contra-indicated or meets with difficulty.

F. Treatment with **mercury by the mouth** no longer has any field of its own except where the other methods are contraindicated.

Pusillanimity on the part of the patient and the impossibility of administering injections necessitate reversion to the old method of oral treatment.

In this connection Ricord's pills (see Part I: *Mercury*) and mercury bichloride in 1:1000 solution (one tablespoonful a day in milk) are among the most serviceable preparations.

In certain refractory and serious cases, in which quick action is of advantage, Jacquet recommended what he termed a "plurimercurial attack" (*assaut plurimercuriel*) or "intermittent hyperintensive plurimercurial treatment," which he deemed capable of yielding results similar to the striking effects of arsphenamin.

This method consists in giving mercury for two to five days in the following manner:

Two pills of 0.05 gram ($\frac{3}{4}$ grain) of mercury protiodide (with two different meals).

An enema containing 200 cubic centimeters (7 fluidounces) of 1:1000 mercury bichloride solution diluted with 80 cubic centimeters ($\frac{2}{3}$ fluidounces) of water. Five to eight drops of laudanum are to be added.

An intramuscular injection of 0.01 gram ($\frac{1}{6}$ grain) of mercury benzoate or biniodide.

At night, an inunction of 2 grams (30 grains) of mercurial ointment.

A number of courses of treatment, each comprising from two to five séances, separated by an interval of at least two weeks, is thus given, the patient being meanwhile closely watched.

UNTOWARD EFFECTS OF MERCURY. THEIR PREVENTION AND TREATMENT.—See Part I: *Mercury*.

Even in average dosage, mercury is far from being a harmless remedy.

The treatment of the untoward effects is mainly prophylactic.—Careful attention to the mouth and close observation will permit of taking measures in time, *viz.*, stopping the addition of fresh amounts of mercury and facilitating elimination of the mercury already introduced.

These untoward symptoms may be harder to overcome when they come on following injections of gray oil or of calomel: Hence the necessity of employing these injections only with caution, after a preliminary milder mercurial treatment that is easier to reduce, in order to test the susceptibility of the patient; hence also the essential precaution of allowing a sufficient interval (eight to ten days) between injections and of beginning with small doses (0.04 to 0.06 gram— $\frac{2}{3}$ to 1 grain). Finally, before any treatment is given, it is well to investigate the patient's renal function by a study of the history, uranalysis (albumin and casts), and if required, by examination of the blood (nitrogen retention).

The curative treatment of mercurial toxic symptoms brings into play all the means of elimination of mercury. The sulphur waters, sulphur in honey, and sulphurous baths are particularly indicated. Vapor baths, sweats and repeated purgation are useful, promoting elimination through the skin.

Finally, diuresis should be increased by the taking of watery beverages, diuretic decoctions and theobromine; throughout the duration of the symptoms the patient should be on a *milk diet*.

II.—ARSENICAL MEDICATION.

The compounds employed in the arsenical treatment of syphilis include:

(a) Arsphenamin (salvarsan, arsenobenzol, etc.), neoarsphenamin (neosalvarsan, neoarsenobenzol, etc.) and Pomaret's eparséno.

(b) Lehnhoff-Wyld's sulfarsenol, which has assumed an important place.

(c) Danysz's luargol, now almost discarded.

(d) Mouneyrat's hectin, now almost discarded.

(e) Mouneyrat's galyl, little used.

For the pharmacology see Part I: *Arsenic*.

* * *

In a work such as the present one, intended for the practitioner, little need be said concerning **arsphenamin**. The preparation of the solution of this compound for intravenous injection is a somewhat difficult matter. Accordingly, this remedy is no longer much used except by a very few specialists.

Neoarsphenamin is used more widely and is more convenient. Ravaut's method of concentrated injections, by virtue of its simplicity and ease of execution, has placed its use at the disposal of all physicians in the treatment of syphilis. It is less toxic than arsphenamin and preparation of the solution to be injected is very easy, since all that is necessary is to add to the product a little *sterile doubly distilled water*. The only important precaution required is to use the solution immediately after its preparation, as it decomposes rapidly upon contact with the air.

Neoarsphenamin is supplied in sealed vacuum ampoules containing progressive amounts of from 0.1, 0.15, 0.3, 0.45, etc., up to 1.2 grams.* Outfits may be obtained containing, in addition to the drug, a 5 or 10 cubic centimeter ampoule of sterile double distilled water and a sterile filtering device.

Filtration of every solution prepared is a wise precaution. Where outfits including a filter are not available, a device similar to that of Vernes may be used. A small piece of batiste is fastened over the cup of the filter with thread and the whole device boiled along with the syringe and needle.

The best method of administration of neoarsphenamin, or at least, the most widely used, is by **intravenous injection**.

The technic of such injections has already been described (see Part II), but stress may well be laid on certain details at this point.

In view of the irritant property of the drug and the sharp pain which follows penetration of the solution outside of the vein, it is necessary that the injection be made precisely into the vein. Care must therefore be taken not to inject any fluid as long as the blood is not flowing out freely through the needle introduced into the vein.

The injection of the drug should be carried out **slowly**—as slowly as possible. This is why some syphilographers prefer the drip method of injection to the injection of a concentrated solution with a syringe. Others recommend mixing the blood with the drug already in the syringe, followed by injection either of the whole at

* Before an ampoule is used it should be examined carefully to see that there is no crack in the glass and that the light lemon-yellow color of the drug has not undergone any change. It is well to discard any ampoule in which the drug is of a darker color. It would be a good plan for the manufacturer to supply on the ampoule itself a standard color serving as a guide, in addition to the date of manufacture and the date after which the drug may not safely be used. One should beware of untoward results occurring in series, and when a tendency to such effects once appears in a patient who has previously borne the drug well, it is well to beware of ampoules bearing the same serial number and return them to the manufacturer.

one time or after further mixing by repeated to and fro movements of the plunger.

During the injection, the introduction of the drug must be carefully watched: It may happen that because of some movement on the part of the patient or the physician, especially if a long-bevelled needle is used, the needle-point passes altogether through the wall of the vein and the solution flows out around the vein. Notice of the fact is likely to be given by reason of the resulting pain, but sometimes the pain is not felt immediately, and on occasion the patient may be asked whether he feels anything. If slight edema should appear about the point of injection, the latter should be stopped at once (to be continued at another point) and, by making pressure all around the area, the attempt should be made to drive out the few drops of fluid that have escaped from the vessel.

An injection made wholly outside of the vein may cause serious and painful trouble; the accidental escape of a few drops of solution, however, generally gives rise only to rather severe pain, which may continue for about two days or even longer. The pain may be allayed, if necessary, with repeated hot applications. An incorrectly administered injection leaves a small fibrous nodule of periphlebitis which remains sensitive for a long time.

It is well to give the injection **with the patient recumbent** and, if necessary, at his home, especially with the earlier injections.

The injection of neoarsphenamin should preferably be given on an empty stomach (though it may be a useful precaution for the patient to take a little tea or coffee an hour beforehand). If the injection is administered in the daytime, it should be given at a time sufficiently remote from the preceding meal (five or six hours). The patient should be advised not to take food during the next few hours; or, at most, a little decoction or milk or light soup, at a sufficient interval after the injection, may be allowed. The possible untoward effects and their treatment will be referred to again later.

Danysz's **luargol** is an arsenobenzol combined with antimony and silver. It is little used. Danysz has also recommended cuproluargol.

Lehnoff-Wyld's **sulfarsenol** is a pale-yellow powder (a less bright yellow than neoarsphenamin), freely soluble in water. It is supplied in sealed ampoules containing doses of from 0.06 to 0.6 gram, with intervening gradations of 0.06 gram. The drug is given intravenously in exactly the same manner as neoarsphenamin.

Sulfarsenol has a definite antisyphilitic action. It has won the favor of a few practitioners on account of its low toxicity and the relative painlessness of hypodermic injections.

Mouneyrat's **galyl**, in the form of an acid salt, is used in doses ranging from 0.15 to 0.4 gram. It is now sold either in solutions already prepared for intravenous injection or in the form of its sodium salt to which merely distilled water has to be added, as in the case of neoarsphenamin. It is well to use only recently prepared solutions of it.

More recently an arsenical preparation known as **acetylarsan** has been introduced into therapeutics. It is an aqueous solution of oxy-acetylaminophenylarsinate of diethylamine, a chemically definite and stable compound containing 21.5 per cent. of arsenic.

The solution, which is neutral in reaction, clear and colorless, is of such concentration as to represent 0.05 gram ($\frac{3}{4}$ grain) of arsenic per cubic centimeter. The ampoules are of 2 cubic centimeters (48 minims) each. The drug is used by intramuscular injection, at the rate of 1 or 2 injections of 3 cubic centimeters a week, to a total of 10, to 15 injections.

Acetylarsan appears to be of marked interest and value as a substitute for the arsphenamins. Its ease of administration and ready tolerance render it a product highly to be recommended.

ADMINISTRATION OF THE ARSENICAL DRUGS BY OTHER ROUTES.

I. Intramuscular Injection.—An attempt has been made by some to rehabilitate the intramuscular method of administering the **arsphenamins**. Thus, Sicard, in nervous syphilis, recommends intramuscular injections of 0.01 gram, with 1 cubic centimeter of 1 per cent. cocaine solution mixed with every cubic centimeter of the arsenical solution.

Some observers, *e.g.*, J. Minet, have likewise used **sulfarsenol** intramuscularly and found it strikingly well tolerated by the local tissues. With only slight pain, all fear of immediate or late complications in some patients is stated to be avoided by the use of this remedy.

Mouneyrat's **hectin** is given in daily intramuscular injections of 0.1 to 0.2 gram for eight to ten days. After a week's intermission the injections are resumed. Hectin exerts a definite, but rather weak antisymphilitic action, and the drug can hardly be regarded as more than an addendum to mercurial treatment or an auxiliary to more vigorous arsenical treatment (to be given, *e.g.*, during the periods of intermission between successive courses).

Of late Pomaret's **eparseno** has been advocated. It is a 40 per cent. amino-arsenophenol, and is equivalent to double the amount of

nearsphenamin. It is given intramuscularly every three days, fifteen to twenty injections constituting a course of treatment. The technic of injection is the same as for gray oil. We have not found this drug as painless as its sponsors have asserted it to be.

In our opinion, hypodermic administration of these drugs will never be any more than an exceptional procedure; to be reserved for timid patients or physicians.

II. Rectal Administration.—This is a very useful method in some cases, especially in children or in patients who are afraid of the injections, and in those with veins so narrow that intravenous treatment is rendered difficult.

Either *suppositories* or *enemas* may be employed.

Suppositories containing from 0.1 to 0.3 gram of drug can easily be prepared; the drug is well tolerated, but its absorption, and consequently its action, remain uncertain.

Such is not the case, however, with enemas, which are very effective and may be highly recommended. Certain precautions should preferably be taken: The patient should be fasting and the bowel should, beforehand, be carefully evacuated and washed out. The drug should be injected rather high in the bowel with a soft rubber catheter. The compound itself should be dissolved in a small volume of distilled water, *viz.*, 15 to 60 cubic centimeters ($\frac{1}{2}$ to 2 fluidounces), with 1 cubic centimeter containing 0.01 gram of the drug.

After the enema has been given, the patient should be advised to rest in bed and take no food for a few hours.

III. Oral Administration.—**Stovarsol** (oxyacetylaminophenylarsinic acid) administered by the mouth in tablets of 0.25 gram (4 grains) each may be useful as an adjunct in the intervals between treatments.

Treparsol (meta-aminoparaoxyphenylarsinic acid), recommended by C. Simon, is likewise used by the mouth in the same dose as stovarsol and has the same advantages and indications.

UNTOWARD EFFECTS OF THE ARSENICAL DRUGS.

Like the mercurial treatment, arsenical treatment is by no means free of all drawbacks or actual risks.

In the first place, there occur certain minor difficulties due to the intravenous injection itself; these are not serious, and have already been referred to.

The true untoward results of the treatment may be either *immediate, early* (in the first few hours or first two or three days after the injection) or *late*.

They may be listed thus :

I. LOCAL COMPLICATIONS OF THE INJECTION :

Local pain, due to escape of fluid outside of the vein.

Periphlebitis, phlebitis, necrosis, thrombosis and rarely embolism.

These conditions are avoided by proper technic.

II. IMMEDIATE COMPLICATIONS :

Cardiac distress with palpitations.

Pain in the back of the neck.

Congestion of the face and eyes.

A special taste noticed at the end of the injection (odor of garlic and ether).

Nitritoid crisis.

III. EARLY COMPLICATIONS :

Nitritoid crisis.

Serous apoplexy.

Persistent heart disturbance with changes in the pulse.

Persistent fever and headache.

Jaundice and albuminuria.

Death.

IV. LATE COMPLICATIONS :

Persistent fever.

Persistent headache.

Gastro-intestinal disturbances.

Jaundice, mild or serious.

Skin eruptions.

Neuro- and meningo-recurrences.

We shall discuss briefly three kinds of untoward results which are relatively common and often serious: The nitritoid crises with or without accompanying shock, the jaundice and the meningeal disturbances.

Nitritoid Crises.—The term refers—by analogy with the effects of inhalation of amyl nitrite—to congestive manifestations of varying gravity (flushing of the face, palpitations, tachycardia, etc.), which may or may not be followed by “shock” manifestations, sometimes witnessed after the intravenous injection of arsphenamin.

The large number of suggestions made as to measures for the prevention of nitritoid crises and of post-arsphenamin shock is itself evidence of the fact that, so far at least, no procedure has proven truly prophylactic.

The least useless of these measures may be recalled thus :

1. Preliminary administration of *adrenalin*, 0.001 to 0.002 gram ($\frac{1}{65}$ to $\frac{1}{32}$ grain) or more, by the mouth (20 to 30 drops of the 1:1000 solution) or by intramuscular injection. The effect is inconstant, often wanting, sometimes temporary, but on the whole, perhaps useful.

2. Preliminary injection, ten minutes before the arsphenamin, of 5 cubic centimeters (80 minims) of *camphor in oil* or of 3 cubic centimeters (48 minims) of *ether* (decidedly painful).

This is a purely symptomatic measure, stimulating the nervous system and heart, obviously advisable, but manifestly non-specific and inconstant in action.

3. Preliminary injection, fifteen minutes before the arsphenamin, of 0.001 gram ($\frac{1}{65}$ grain) of *atropine*. This proceeding, tending to cut off the action of the vagus, which is an important factor in "shock" phenomena, is theoretically and, at least in part, actually a rational one. As a matter of fact, such a dose of atropine is poorly borne by many sympatheticotonic patients, and it is just as inconstant in its effects as the procedures already alluded to.

4. On the basis of the antiflocculant properties of sodium thiosulphate (Lumière and Chevrotier), Ravaut has tried prophylactic *intravenous injections of sodium thiosulphate* in a 20 per cent. solution in doses of 4 to 15 grams (1 to 4 drams), testing the patient's susceptibility to the drug.

We do not yet know whether this kind of preventive injection does not call for as much caution and does not entail as many uncertainties as the arsphenamin itself.

5. Sicard recommends a preliminary intravenous injection of 30 cubic centimeters (1 fluidounce) of *physiologic salt solution containing 0.6 or 0.7 gram (9 to 11 grains) of sodium carbonate*. It seems advisable to prepare this solution just before use, dissolving the sodium carbonate (like the arsphenamin), which should be chemically pure, perfectly sterile and supplied in a sealed ampoule, in 30 to 40 cubic centimeters (8 to 10 fluidrams) of sterile distilled water. The sodium carbonate in solution ultimately acts chemically on soft glass and deteriorates.

6. *Emery's antianaphylactic procedure*.—This consists in beginning with very small doses, gradually increased daily (0.01, 0.02, 0.03, 0.04, 0.05 and 0.06 gram), before administering the curative doses constituting the treatment proper.

7. *Neoarsenical anticlasia by topophylaxis*.—Sicard, Paraf and Forestier, after having made a study of various procedures, including intravenous injections of sodium carbonate, sodium chloride and glucose, intended to obstruct the post-neoarsenical colloidoclastic crises, demonstrated the practical nature and simplicity of another procedure: A constricting band

is applied for a few minutes to confine the neoarsenical injection in the one limb; the hemoclastic shock is thus dealt with locally, and this process of *topophylaxis*, which causes no local harm, is stated often to protect the patient from the general form of "shock."

* * *

In truth, the pathogenesis of post-arsphenamin shock, in common with that of all other "shock" phenomena, is still—in spite of, and partly on account of, the accumulated contradictory contributions on the subject—decidedly a mystery. Even the mechanism of the flocculation of serums, which seems to be a practically constant attribute of the disturbance, has so far been only very incompletely elucidated. Thus, despite the apparently scientific "shell" with which most of the remedies rightly or wrongly offered as having anti-shock properties are garnished, they are actually mere empiric procedures, of which a few, however, are not devoid of value.

* * *

From the standpoint of everyday practice, the essential recommendations may, it would seem, be summarized as follows:

1. Examine the patient thoroughly, with especial reference to the blood-pressure, liver, kidneys and nervous system, before the treatment, and abstain or be extremely guarded, or use the rectal route (enemas), where there is some serious defect (aortic lesion, cardiac insufficiency, very high or very low blood-pressure, hepatic insufficiency, nephritis, etc.). Beware of cases of Graves's disease, adrenal insufficiency and, especially, hypotonia in persons with neurovascular asthenia.

2. In a new case whose tolerance is not known, begin only with small doses (0.15 to 0.3 gram, at the most); increase only gradually, especially after the third dose.

3. Whenever possible, administer the injection at the patient's home, or at least, with the patient completely recumbent and with the head low. Almost absolute rest should be required in the hours preceding the injection.

4. Administer the injections (especially the earlier ones) very slowly (three to five minutes), in order to be able to stop in case of threatened trouble.

5. Fifteen minutes before the injection, give 20 to 30 drops of 1:1000 adrenalin solution, and in asthenic subjects with low blood-pressure give a preliminary injection of 5 cubic centimeters of camphor in oil.

6. See that the injection is given on a day of at least relative rest (no fatigue nor overstrain) and even, if possible, of rest in recumbency—and of relative fast (milk diet, 2 liters, or better, a strict fruit diet).

7. Insist on the patient's remaining recumbent for at least five minutes after the injection and give him a hot stimulating drink, such as sweetened tea, with the addition, if necessary, of a preparation of ammonium acetate.

This mode of procedure, strictly adhered to by us since 1915, has enabled us to administer hundreds of office injections of neoarsphenamin without any noteworthy untoward result.

* * *

In the event of a *nitritoid crisis*, of *established shock*, it is advisable to act quickly, as soon as the pulse becomes rapid, uneven and small, the face flushes, and the conjunctivæ become injected, without waiting for the patient to complain of coldness of the extremities, tingling at the lips, faintness and oppression.

1. Give an immediate intramuscular injection of 0.001 to 0.002 gram of adrenalin, and if the syncopal tendency becomes more marked, do not hesitate in administering slowly by the intravenous route 0.0005 to 0.001 gram ($\frac{1}{30}$ to $\frac{1}{65}$ grain) of adrenalin. The best plan, in the latter procedure, is to draw up the contents of an ampoule of 0.001 gram of adrenalin in 10 cubic centimeters (2½ fluidrams) of physiologic salt solution and carry out an injection of 1, 2, up to 10 cubic centimeters of the solution thus obtained, according to indications. Thus, any physician administering an injection of arsphenamin should always have at hand two sterile syringes of 2 and 10 cubic centimeters capacity, respectively, with their needles; two ampoules of 0.001 gram of adrenalin, and one 10 or 20 cubic centimeter ampoule of physiologic salt solution.

2. If required, camphor in oil and caffeine.

3. External heat.

Arsphenamin Jaundice.—This question of syphilitic jaundice has been and is still the subject of active controversy, to say the least.

Some observers absolutely deny the occurrence of toxic icterus following arsphenamin, and agree only to the possibility of syphilitic icterus developing as the result of a process of reactivation. This is an exaggerated view.

The following facts—recognized without question, it would seem, by all observers—lead inevitably to the conclusion that some of these cases of jaundice (the minority) are of syphilitic nature and the majority of toxic nature. Indeed:

1. Cases of jaundice have become much more common since syphilitics have been treated with the arsenobenzol derivatives.

2. Numerous cases of jaundice develop only after a long series of injections and the administration of a large amount of arsphenamin; they often become less and disappear after cessation of the treatment.

3. Jaundice has not been observed in the course of mercurial treatment, nor even in the course of arsphenamin treatment by the hypodermic route.

4. Nevertheless it is true that some instances of jaundice, appearing in syphilitics who have recently received one or more series of intravenous injections of arsphenamin, rapidly disappear under the influence of additional injections of larger doses. It seems impossible, therefore, not to acknowledge the specific nature of this last group of jaundice cases. Very probably in these cases the earlier doses of arsphenamin have placed the hepatic cells in a condition of lowered resistance in respect of the spirochete; the later larger doses caused the syphilitic lesions to retrogress. The course to be followed may be logically based on the foregoing considerations:

Prophylactically:

Arsphenamin medication should be abstained from in subjects suspected of having hepatic insufficiency, or the drug given only by the hypodermic route. A diet of milk, vegetables and fruit should be prescribed during the period of treatment.

Curatively:

The treatment should be stopped, and *arsphenamin jaundice* treated like grave toxic icterus: Diet of fruit or milk and fruit, methenamine, and diuretic, tonic and stimulant medication (saline, lactose or glucose solutions, camphor in oil, etc.).

Syphilitic jaundice should be dealt with by intensive arsphenamin treatment in combination with the dietetic and tonic measures above referred to.

Meningeal Disturbances.—Even during a well-conducted arsphenamin treatment in the earlier stages of syphilis, meningeal manifestations may appear, the correct interpretation of which is often highly difficult, yet necessary for proper treatment.

The disturbance may consist of either:

1. A **neuro-recurrence**, manifested in headache, dizziness and tinnitus aurium—disturbances in the domain of the optic and auditory nerves which constitute as many alarm signals and demand reduction of the doses of arsphenamin to avoid running the risk of a spirillo-toxic reaction, care being taken, however, not to interrupt the treatment.

2. A **spirillotoxic reaction** (*Herxheimer's reaction*), related to the destruction of the spirochetes in the brain resulting from an excessive dose of the drug. This condition generally occurs a few hours after the injection in patients who have already presented some of the nervous symptoms already alluded to, accompanied by marked changes in the cerebrospinal fluid. In these patients, resumption of the treatment as soon as the intensity of the reaction diminishes is necessary. But this should be done cautiously, with small doses at first; a striking improvement in the clinical condition can thus be effected. These patients require intensive (5 to 6 grams) and repeated treatment (four to six courses at intervals of only six to eight weeks); it is difficult, indeed, to produce a lasting favorable influence on the changes in the cerebrospinal fluid in these cases.

3. A **cerebral arsenotoxic reaction**.—Such a reaction ordinarily appears only after several days' delay, and occurs in subjects whose nervous system seems uninvolved and whose cerebrospinal fluid shows little or no change. In these patients the arsenical treatment should be interrupted; after six or eight weeks, however, the heightened sensitiveness due to the drug will generally have subsided, and the treatment can be resumed with small, progressive doses, given at rather long intervals.

Systematic repetition of lumbar puncture is necessary for diagnostic and therapeutic purposes in these troublesome cases.

III.—IODIDE MEDICATION.

Iodine, generally employed in the form of potassium or sodium iodide, is not, strictly speaking, a specific remedy in syphilis, but an adjunct agent. It is especially valuable in the *tertiary stage*, particularly in cases of gumma, tertiary syphilomas and syphilis of the testicle. It may be useful in the *primary stage* for certain chancres exhibiting an ulcerative or phagedenic tendency. In the *secondary stage*, it seems to act favorably on the headache, on some cases of neuralgia or periostitis, and in early malignant syphilis. The iodides are generally administered by the mouth. The time-honored combination of potassium iodide with mercury is often useful in the intervals between courses of active mercurial or arsenical treatment.

IV.—BISMUTH MEDICATION.

Bismuth is assuming an increasingly important place in the treatment of syphilis.

Balzer was the first in 1889 to propose the use of bismuth in syphilis, but the results of his experiments on the toxicity of bismuth in animals, mistakenly interpreted, caused him to abandon them.

In 1911, Santon and Robert, of the Institut Pasteur, studied the bactericidal properties of bismuth against the tubercle bacillus and in the spirillosis of fowls. These early researches, interrupted by the premature death of Santon during the war, were taken up again and continued by Sazerac and Levaditi, who were the first to bring out the special and particularly powerful action of bismuth on the treponema (1921).

Following these earlier observations, clinical researches were instituted by L. Fournier and Guénot, who demonstrated the surprising efficacy of bismuth.

Later research by different observers confirmed these early results, and at the present time bismuth has definitely entered anti-syphilitic therapeutics, in which it is occupying an increasingly preponderant place.

Indeed the bismuth salts "can apparently be considered as akin to the arsenicals in healing power and as fundamental specifics comparable to the mercurials" (Drouin).

Powerful action, low toxicity and convenience of use—these are the principal advantages of bismuth.

Nevertheless, at the moment it must be said that we are as yet in the experimental stage with bismuth, and that many points remain to be cleared up.

The Treponemicidal Action of Bismuth in Experimental and in Human Syphilis.—Sazerac and Levaditi demonstrated to a certainty the antispirochetic action of bismuth in experimental syphilis in the rabbit.

In man, already in 1922, Levaditi, and after him Fournier and Guénot, showed that the spirochete disappears from the surface of the chancre sometimes as early as the day following the first injection, though more usually after the second, and that it seldom persists after the third.

The various and numerous experimenters who followed up the subject all confirmed these results, and it is now accepted without question that apart from certain cases of bismuth resistance, analogous to those obtaining with mercury or arsenic, bismuth is possessed of unquestionable spirillicidal properties, manifested in immobilization of the parasites in the specific lesions, in their destruction, and lastly, in their disappearance.

From the standpoint of efficacy, intensity and rapidity of this action, bismuth is clearly superior to mercury, and its action seems to be little short of equalling that of the arsenical salts. Perhaps the difference is due to the circumstance that the arsenicals are more gen-

erally injected intravenously, which method acts more rapidly, while the bismuth salts are given hypodermically, which entails slower absorption and a slight delay in their effect.

In the *primary stage*, bismuth acts destructively not only on the spirochetes of the chancre, but also on those contained in the afferent lymph-nodes of the chancre. It thus brings about rapid healing of the lesion.

In the *secondary stage*, the spirochetes disappear from the mucous patches after one or two injections, and healing of the patches rapidly follows. The eruption, the secondary headache, and the different symptoms of this stage generally yield to bismuth treatment, and even in early serious secondary syphilis bismuth is asserted to have given good results (Léri, Azoulay, Tzank, etc.).

In *tertiary syphilis*, bismuth acts effectively, in a manner superior to mercury, and almost equal to the arsenicals, on the usual manifestations (gummas and ulcerations). It is clearly active in vascular syphilis and visceral syphilis, without presenting the risks incurred in the arsenical treatment.

In *nervous syphilis*, bismuth performs useful service (some even maintain that it finds one of its principal indications in these cases). It exerts an undoubted influence in the specific forms of meningitis and in meningo-myelitis; it improves tabes and may assist in bringing its progress to a standstill.

In *hereditary syphilis*, bismuth exerts a favorable influence on the pregnancy of the syphilitic woman and on the health of the child.

In *congenital syphilis*, bismuth acts quickly and effectively on the lesions of the skin and mucous membranes, on weak and athreptic infants, and on the meningeal localizations.

As for the *Bordet-Wassermann reaction*, bismuth treatment is capable of preventing the appearance of a positive reaction, when instituted from the very first appearance of the chancre; but even when applied late, bismuth may, in time, cause this obstinate stigma of syphilis to disappear.

Elimination of Bismuth.—Bismuth introduced into the system is eliminated principally *with the urine*, in which it appears scarcely a few hours after the injection. This elimination continues through all the time absorption of the remedy is going on, which would indicate a prolonged action. The urine is normal when voided; it becomes slightly blackish after standing for some time.

Elimination of bismuth takes place also with the *saliva*, through the *digestive tract*, with the *bile*, and likewise through the skin.

Pharmacology and Dosage of Bismuth.—Modes of Administration.

—At the present time the number of bismuth preparations recommended for the treatment of syphilis is very great, and the practitioner may have some difficulty in choosing from so many.

In making his choice, the practitioner has to consider, in the preparations at his disposal, on the one hand the content in *metallic bismuth*, and on the other, the secondary agent (iodine, mercury, or arsenic) calculated to enhance its action, and lastly, the ease of absorption of the drug and the amount of pain caused by the injection.

The *dose* of bismuth in syphilis appears now to be fixed, without empiricism, at 0.15 to 0.25 gram ($2\frac{1}{2}$ to 4 grains) of metallic bismuth weekly, divided into 2 injections, while the amount for an entire course of treatment is from 2 to 3 grams (30 to 45 grains).

In general, with Levaditi, one may distinguish:

- A. The preparations of metallic bismuth.
- B. The organic bismuth salts.
- C. The inorganic bismuth salts.
- D. The alkaloidal bismuth salts.

A. Metallic Bismuth.—This is used in a state of fine subdivision in an isotonic solution of glucose (neotrepol) containing 96 per cent. of bismuth; 1 to 2 cubic centimeters (16 to 32 minims) are injected intramuscularly twice a week, 10 or 12 injections comprising a total of 2 grams (30 grains) of metallic bismuth.

Colloidal bismuth (Lacapère) is a suspension of bismuth particles kept in a colloidal state, prepared by Fouard under the name ionoid of bismuth. It can be administered intravenously or intramuscularly.

Intravenously, its action is rapid and intense, while intramuscular injections have a milder and more lasting action.

Colloidal bismuth contains 22 milligrams ($\frac{1}{3}$ grain) of bismuth per cubic centimeter. It is used in injections of 1 to 3 ampoules at a time, three times a week, *i.e.*, 0.1 gram ($1\frac{1}{2}$ grains) of bismuth weekly, each course comprising 20 to 25 injections.

Bismuth amalgam, consisting of 3 parts of metallic bismuth to 1 part of bismuth-mercury, in suspension in a mixture of sterile oil of sweet almonds and lanolin, is injected with the same syringe as is used for injections of gray oil. One gradation on the syringe represents 0.01 gram ($\frac{1}{6}$ grain). Two injections of 0.07 gram (1 grain) are given weekly for 10 to 12 weeks.

B. Inorganic Salts of Bismuth.—The most used of these is *bismuth hydroxide*, which occurs in the form of a white insoluble powder containing 86 per cent. of pure metallic bismuth.

Bismuth hydroxide forms the basis of the preparations recommended under the name "*muthanol*" (an oily, radium-bearing emulsion containing 0.12 gram—2 grains—per ampoule), or *curalues* (Lafay), a suspension in oil and lanoline in ampoules containing 0.08, 0.16, 0.24, or 0.32 gram ($1\frac{1}{4}$ to 5 grains) of bismuth, which permits of varying the intensity of the treatment (10 to 12 injections, up to a total of 2.5 to 3.5 grams—40 to 55 grains—of bismuth).

The hydroxides, which are drugs of great stability, are of intermediate power and are more suitable for maintenance treatment than for "attack" treatment (Lacapère).

C. Organic Salts of Bismuth.—The first attempts at the treatment of syphilis with bismuth were made with compounds of this group—in particular, with *sodium and potassium tartrobismuthate* (trepol).

The present bismuth content of the drug is 64 per cent. It occurs in the form of a white powder suspended in oil. The injections are rather painful and are not always well tolerated.

Trepol is supplied in ampoules of 2 cubic centimeters (32 minims), containing 0.2 gram (3 grains) of the salt. Three injections a week are given, amounting to 0.13 gram (2 grains) of bismuth metal. Each course consists of about 12 to 15 injections, or, in all, 2 grams (30 grains) of bismuth.

Lual (Charron), or bismuthotartrate of uranium and ammonium, is a true emetic which is extremely soluble in water, non-toxic, and very active. Deep intramuscular injections are given every two or three days, up to 10 injections per series, a course of treatment comprising 2 or 3 such series of 10 injections.

Pomaret's *galismuth* (Pepin) is *ethylene diaminebismuthogallate*, an organic salt of very low toxicity, highly active, and only slightly painful, provided a little stovaine be added when mixing. This product is supplied in ampoules of two colors, the one yellow, containing the bismuth compound, the other blue, containing the anesthetic solution; the 2 liquids are mixed just before use by drawing in succession into the same syringe the contents of the two ampoules.

Each injection represents 0.03 gram ($\frac{1}{2}$ grain) of metallic bismuth per cubic centimeter. The preparation is used in series of 12 to 20 injections of 1 to 2 cubic centimeters (16 to 32 minims), according to the intensity of action required and the resistance of the patient.

In the group of organic bismuth compounds a separate place must be given to the sodium derivative of *trioxybismuthobenzoic acid* (*benzobismuth*), studied by H. Grenet and Drouin. Benzo-bismuth occurs as a light yellow powder, freely soluble in distilled water. The resulting solution, even when concentrated, exerts no untoward action on the blood,

and its toxicity is very low. Benzo-bismuth contains 45 per cent. of metallic bismuth. It is obtainable in outfits each comprising 2 kinds of ampoules, one kind containing the product in powder form, the other the solvent. Mixture of the liquid and the powder is effected at the time of using by squirting the solvent drawn up into the syringe upon the powdered drug contained in the second ampoule.

The treatment generally consists of 15 to 20 injections at the rate of two or three a week.

Of low toxicity, and hardly felt on injection, benzo-bismuth furnishes an excellent method of administering bismuth, which may be employed even in the most sensitive patients. In view of its perfect solubility it may be used intravenously.

Mention should also be made of certain organic compounds of bismuth, in particular with the cacodylates. Such are the Corbière *cytarsan* (0.05 gram— $\frac{3}{4}$ grain—of metallic bismuth per ampoule, together with 0.03 gram— $\frac{1}{2}$ grain—of arsenic), and *bismuth cacodylate* (Gasser B. de Coirre), in ampoules of 2 cubic centimeters (32 minims) containing 0.04 gram ($\frac{2}{3}$ grain) of metallic bismuth in sucrose solution.

D. Alkaloidal Salts of Bismuth.—Among this series, special mention will be made of *quinine iodobismuthate*, occurring in the form of a handsome vermilion red powder which contains 3 per cent. of metallic bismuth. It is used in 10 per cent. oily solution.

First prepared by Aubry under the name of *quinby*, it is also furnished under the names *iodobismuthate* (Fraise) and *rubyl* (Poulenc).

Quinine iodobismuthate is usually administered in series of 12 injections of 3 cubic centimeters (48 minims) each, at the rate of about 2 each week.

It is given by deep intramuscular injection, care being taken not to inject the drug into the blood-vessels (which is easily attained by injecting in 2 stages—first the puncture, then the injection).

This form of treatment, which is generally almost painless, being in fact the least painful of all the bismuth salts, is of unquestionable efficacy, and its use has greatly increased in late years. I unhesitatingly give this drug the preference.

Untoward Effects of Bismuth Medication.—As a general rule bismuth medication is well borne.

Slight albuminuria, generally of little account, has been reported.

The most frequent of the untoward results, which may, on account of its mild nature, be considered merely an incident, is *bismuth stomatitis*.

Care of the mouth, as a preventive measure, should be recommended to every patient undergoing bismuth treatment.

I.—PREPARATIONS OF METALLIC BISMUTH.

NAME.	CHEMICAL COMPOSITION.	EXCIPIENT.	SIZE OF AMPOULES.	CONTENT OF METALLIC BISMUTH.			MODE OF ADMINISTRATION.
				PER CENT.	PER C.C.	PER AMPOULE.	
Neotrepol.	Precipitated metallic bismuth.	Oil.	2 c.c.	96	0.096	0.192	Two intramuscular injections weekly; in courses of 10 to 15: 2 to 3 grams of bismuth.
Bismuthyl.	Do.	—	2.5 c.c.	97	0.10	0.25	Three intramuscular injections in 2 weeks: 10 to 12 in a course.
Bismuth amalgam.	Metallic bismuth, 3 parts; metallic mercury, 1 part.	Oil and lanolin.	—	—	—	—	Deep intramuscular injections with Barthélemy's syringe: One division = 0.01 of amalgam (0.0075 Bi and 0.0025 Hg): Ten divisions of the syringe to be injected weekly; 15 injections per course.
Bismuth ionoid.	Colloidal bismuth.	Water.	3 c.c.	—	0.0022	0.0176	Three injections weekly, intramuscularly; if necessary, can be given intravenously.
Bismuthoidol.	Colloidal bismuth.	Glucose solution.	2.5 c.c.	—	0.004	0.008	One injection on alternate days in a course of 10 injections.
Colmuthol.	Colloidal bismuth.	Glucose solution.	2 and 4 c.c.	—	—	0.02	Two to three injections weekly.

II.—ORGANIC SALTS OF BISMUTH.

NAME.	CHEMICAL COMPOSITION.	EXCIPIENT.	SIZE OF AMPOULES.	CONTENT OF METALLIC BISMUTH.			MODE OF ADMINISTRATION.
				PER CENT.	PER C.C.	PER AMPOULE.	
Tropol.	Concentrated bismuth enetic; tartro-bismuthate of Na and K.	Oily suspension.	3.5 c.c.	64	0.064	—	Intramuscular injection every four or five days. Course of 12 injections (1.4 to 1.8 grams of bismuth).
Benzo-bismuth.	Sodium derivative of trioxobismuthobenzoic acid.	Powder and solvent in two separate ampoules.	0.02 or 0.03 gram of powder.	20	—	—	Of very low toxicity, not painful, very convenient to use on account of its solubility. Can be injected intravenously. Courses of 10 to 20 injections; 3 weekly.
Oleo-bismuth.	Oleate of bismuth.	Oily suspension.	2 c.c.	—	—	0.105	Courses of 12 to 20 intramuscular injections; 1 every four days.
Tartro-bismuth.	Tartro-bismuthate of Na (soluble).	Aqueous solution.	1 c.c.	35	0.10	0.10	Intravenous injections. Begin with ½ ampoule, then a whole ampoule every two days for five days; three days' rest; 1 ampoule for 4 days; five days' rest; then 1 ampoule for two days.
Lual.	Bismuthotartrate of uranium and ammonium.	Guaiaacolate glucose solution.	1 c.c.	—	—	0.047	Courses of 15 intramuscular injections; 2 weekly.
Cylarsan.	Bismuth cacodylate.	Sucrose solution.	5 c.c.	0.01	—	0.05	Intramuscular or, exceptionally, intravenous route. Two injections per week; courses of 10 or 12.
Glasser-Bi.	Do.	Do.	2 c.c.	—	—	0.04	In courses of 12 injections.

III.—INORGANIC SALTS OF BISMUTH.

NAME.	CHEMICAL COMPOSITION.	EXCIPIENT.	SIZE OF AMPOULES.	CONTENT OF METALLIC BISMUTH.			MODE OF ADMINISTRATION.
				PER CENT.	PER C.C.	PER AMPOULE.	
Muthanol.	Bismuth hydroxide with $\frac{1}{2}$ to 1 microgram of radium.	Radium-bearing oily suspension.	2 c.c.	64	0.064	0.128	Intramuscular injection every two days; 10 in a course.
Curalues (insoluble).	Bismuth hydroxide.	Oil and lanolin.	1 c.c.	86	0.08	0.16	One injection every four days; 6 in a course.
B. I. A.	Bismuth hydroxide.	Oily suspension.	2 c.c.	—	0.20	—	In courses of 12 to 15 intramuscular injections (two weekly), to a total of 3 grams of bismuth per course.
Treposan.	Bismuth succinate.	Oil.	3 c.c.	—	—	0.20	One injection of 3 c.c. every four days; 12 to 15 injections.
Galismuth.	Ethylene diamine-bismuthogallate.	Sucrose solution.	1 c.c.	—	—	0.03	Two to three intramuscular injections weekly; 12 to 15 injections. An antiseptic solution accompanies each ampoule.

IV.—ALKALOIDAL COMPOUNDS OF BISMUTH.

NAME.	CHEMICAL COMPOSITION.	EXCIPIENT.	SIZE OF AMPOULES.	CONTENT OF METALLIC BISMUTH.			MODE OF ADMINISTRATION.
				PER CENT.	PER C.C.	PER AMPOULE.	
Quinby.	Bismuth iodoquininate.	Oil.	3 c.c.	26.1	0.24	0.72	One intramuscular injection every four days; 12 in all.
Bismuth iodoquininate (Fraise).	Do.	Do.	3 c.c.	—	0.24	0.72	As above.
Rubyl.	Do.	—	—	—	—	—	As above.
Trepopoquinol.	Do.	Organo-synthetic aqueous solution.	2.5 c.c.	—	—	—	One intramuscular injection weekly; courses of 12.
Ercé	Do.	Oily suspension.	2 c.c.	—	—	0.04	Two intramuscular injections weekly; courses of 12.
Néoby.	Vanadium iodobismuthate.	Oil.	2 c.c.	50	—	0.04	Two intramuscular injections weekly; 15 to 20 injections.

As soon as alarm signals, such as blue line on the gums and a tattooed aspect of the oral mucosa, make their appearance, and without waiting for ulcerations, the treatment given should be reduced, the intervals between injections lengthened, and if necessary, the drug stopped for a time.

The elimination of bismuth with the urine will be facilitated by a milk diet and diuretics; elimination with the feces, by repeated purgation. Lastly, administration of sulphur will assist in the elimination of bismuth, transforming it into the sulphide.

For actual ulcerations, local applications of methylene blue and gargling with potassium chlorate should be availed of.

Bismuth stomatitis generally yields to treatment in a short time.

A GENERAL OUTLINE OF THE TREATMENT.

The treatment of syphilis has undergone marked changes in the last ten years.

If we now endeavor to condense into a small compass the main features of the clinical teachings resulting from experience in the treatment of syphilis in recent years, it may be said that the dominant fact is the unanimity of opinion established as to the value and superiority of the arsphenamins.

Discussion now deals mainly with the place to be assigned to the 2 other antisyphilitic agents—bismuth and mercury.

To make a decision in this connection, it must be understood that the treatment is no longer directed merely to "clearing up" the patient and causing the existing manifestations of the disease to disappear, but that the new methods enable us to hope for complete extinction of the specific virus, in a word, for a true cure of syphilis.

Consequently, the treatment aims to be as early and as intense as possible in its initial assault against the disease.

For this first *intensive or assault treatment* the arsphenamins are particularly adapted and are to be followed by a course of bismuth.

When the condition of the patient does not permit of the use of the arsphenamins, bismuth in large doses may be administered alone, the bismuth treatment being completed, however, by treatment with mercury.

Apart from the onset of the disease, or in a patient who has already been under treatment, recourse should be had mainly to *maintenance courses*, i.e., to a *consolidation treatment*, for which *bismuth* and *mercury* are particularly suitable.

A. Arsenical Medication.—(a) *Choice of the drug.*—Neoarsphenamin so far appears to be the compound of choice. Properly manu-

factured and applied, it gives the most uniform results with the minimum of hazards. The derivatives and similar compounds have not as yet shown any appreciable superiority over it.

(b) *Dosage*.—Three to 5 or 6 grams of neoarsphenamin in ten injections ranging from 0.15 to 0.9 gram each, at intervals of about five to seven days, make up the initial “attack treatment,” and it seems imprudent to remain below this amount. On the whole, 0.01 to 0.015 gram per kilogram (2.2 pounds) of body-weight would appear to be the average maximum dose. Later additional courses of treatment are required, as we shall see further on.

(c) *Mode of administration*.—The intravenous route remains the route of choice for the present. The hypodermic and rectal routes should be reserved for cases in which timidity on the part of the patient, remoteness of the physician or some special indication (condition of the liver, kidneys or heart) render them necessary.

B. Bismuth Medication.—Bismuth, it seems, may be ranked immediately after the arsphenamins in the rapid healing of specific lesions and as an “assault” remedy.

It has over the arsenicals the advantages of a less toxicity and of greater ease of administration.

C. Mercurial Medication.—The place occupied by mercury in the treatment of syphilis remains rather important. Less severe and less powerful in dispelling the lesions than arsenic, it has a more lasting and more deep-seated effect. It remains the fundamental remedy for syphilis, for it must be remembered that it is the only one that is of proven value in the prevention of tertiary syphilis (Darier).

After two courses of 4 to 5 grams of arsphenamin (ten to twelve injections at five-day intervals) within the first six months of the disease (“attack treatment”), it is well to institute, in conformity with the classic teachings of Fournier, mild courses of mercury, of varying frequency and duration according to the kind of case dealt with and the special indications present. Injections of gray oil in series of six, and in some cases mercurial suppositories, remain, in my opinion, the best method of administering mercury.

Courses of 3 to 4 grams of arsphenamin or of bismuth (10 to 12 injections of quiniobismuth) may with advantage be interspersed during the first four years of the disease.

D. Iodide and Sulphur Medication.—The iodides are often useful in the course of the secondary stage (headache, osteocopic pains, etc.), and sometimes indispensable in the tertiary stage (gummas, aortic dilatation, etc.).

Sulphur treatment enables the patient to take amounts of mercury which could not be borne without its assistance.

E. Duration and General Management of the Treatment.—As Drouin judiciously points out, the classic directions of Fournier still hold good, and it is easy, by incorporating the recently acquired facts, to recast them into the following form, which summarizes rather well the purposes now underlying the treatment of syphilis:

"First of all, a series of courses of arsenic or of arsenic and mercury, then, of mercury and sometimes iodides, administered at intervals during the earlier (first four) years of the disease and separated by periods of rest of increasing length as time elapses since the start of the infection; the whole, in the absence of intercurrent disturbances, under the control, as regular as circumstances permit in the individual case, of the Bordet-Wassermann-Vernes reaction."

The principle of prolonged and alternate medication is not, indeed, applicable to syphilis alone; it also applies, as is well known, to malaria. There are many reasons for this; one of the most plausible is that the parasites are only with difficulty accessible to the drug in the structures (*e.g.*, the spleen) in which circulation is at a lower rate, whence the need of periodic attacks on the germs, corresponding approximately to the periods in which the organisms are multiplying again in the tissues accessible to the remedy.

It is also advisable to take into account the tendency to spontaneous recovery from syphilis which exists in some subjects. Diday already called attention to this fifty years ago. Lesser (*Berlin. klin. Woch.*, June 13, 1921) estimates at nearly 50 per cent. the number of syphilitic subjects who probably undergo spontaneous recovery at the end of twenty years.

Accordingly, for practical purposes, an outline of the treatment of a case of syphilis diagnosed early, of average severity and without any special indications, may be drawn up as illustrated in the table on page 1703, which, it should be remembered, is not to be regarded as more than an outline, requiring a careful adaptation to each special clinical condition.

I. PRIMARY SYPHILIS.—As soon as the diagnosis of hard chancre has been made, rapid and energetic action is necessary.

In this stage sterilization of syphilis is a possibility as long as the spirochete has not passed beyond the lymph-nodes and the Wassermann reaction remains negative.

Arsenical medication, whenever it is possible to apply it, should be brought into play immediately.

Neoarsphenamin, by reason of its ease of administration, has so far retained the favor of the non-specializing practitioners. It constitutes very good treatment. It is well to begin only with small doses and increase them with caution.

As a rule, the initial dose should be 0.1 or 0.15 gram. In accordance with the patient's condition, one may pass more or less quickly to the next higher dose. The earlier injections may be given close together, at intervals of only two or three days; gradually, as the doses become larger, a longer interval between successive injections should be allowed; generally, beginning at 0.45 gram, we allow an interval of a week between injections. Some carry the treatment up to large doses (1.2 gram). We prefer not to exceed 0.75, or rarely 0.9 gram.

In this first "**storm treatment**" (*cure d'assaut*), in a healthy adult who is standing the treatment well, one may proceed up to a total of 6 or 7 grams divided into a series of about ten or twelve injections, given at intervals of about five days. According to the case and the body-weight, however, in a woman or young man the total amount should be limited to a much lower figure—3 to 5 grams—with the expectation of soon starting another course of injections. If, for any reason, neoarsphenamin is badly tolerated it may be replaced either by **sulfarsenol** (0.06 to 0.72 gram—1 to 12 grains—per injection, *i.e.*, 3 to 4 grams—45 to 60 grains—in ten injections) or by **acetylarsan** (see page 1677).

If the patient is actually resistant to arsenic, bismuth treatment should be applied from the first.

In this first course of treatment, which should be as active and energetic as possible, **mercury** may be added in the form of **intravenous injections** of mercury cyanide (0.01 gram) in series of ten to twelve daily injections.

The combination of the two treatments, arsenical and mercurial, should always be restricted to patients with good resisting powers. In the majority of instances it is preferable to alternate the two agents without combining them, and after a first series of neoarsphenamin injections, proceed at once with a course of mercury or a course of bismuth.

Where for some reason the mercury cyanide treatment has to be given up, it should be replaced:

Either by a series of **six intramuscular injections of gray oil** (from 0.06 to 0.08 gram—1 to 1¼ grains).

Or by a series of **intramuscular injections of mercury benzoate** (20 to 25 injections).

Or, finally, where intramuscular treatment is not well borne, by **suppositories** in series of ten (0.04 to 0.08 gram— $\frac{2}{3}$ to $1\frac{1}{4}$ grains—in each suppository) or by **inunctions**.

The course of mercury may advantageously be replaced by a course of *bismuth* immediately following the arsenical treatment.

Among the many preparations recommended, I prefer **bismuth iodo-quinat**, which is *very active, not painful*, in series of twelve injections of 2 to 3 cubic centimeters (32 to 48 minims)—two injections weekly. The soluble **benzo-bismuth** may likewise be highly recommended (see page 1686), and, when an intensive effect is desired, may be given in intravenous injections. The same is true of *colloidal bismuth*.

After this first "storm treatment," the complement fixation test should be taken.

If it is negative, a rest interval of six weeks to two months may be allowed, then another test made, after reactivation. If the Bordet-Wassermann reaction this time is positive, the arsenical and mercurial treatment should be resumed, with sufficient vigor.

If the reaction is negative, it will be sufficient for the practitioner to keep his patient under observation and follow up the serum reaction with sufficiently frequent tests.

At the least sign of trouble, the treatment should be resumed.

If no symptoms appear and if the Bordet-Wassermann reaction remains uniformly negative, even after reactivation, there are good chances that the disease has been cut short.

Even under such circumstances,* however, it is well to institute prophylactic treatment for a time, and for at least two or three years it will be advisable to give such a patient two courses of mercury a

* This is all the more necessary if one takes into account a very important contribution by the distinguished syphilographer, L. Bernard, of Brussels. This observer has published an impressive series of statistical tables in which he shows that, in patients treated vigorously from the outset, the *blood* Wassermann rapidly becomes negative, whereas in patients in whom treatment is begun after the chancre, during the secondary stage, the *blood* Wassermann remains positive for a longer time, yet, on the other hand, if, a few years later, the same patients are examined as regards the *spinal* Wassermann, it is found that the *positive spinal* Wassermanns are more frequent in the patients of the first group, treated from the beginning of the chancre, than in those of the second group, treated late. If these impressive observations were to be confirmed, all that we now believe established would be completely overthrown.

In scientific matters, it is always necessary to be imbued with the provisional nature of all that we believe demonstrated, even that which appears to us to have been the most thoroughly established.

Bernard accounts for these observations by stating that the early treatment destroys, or rather, prevents the formation of, the antibodies which partly defend the body against the disease.

Let me hasten to say, however, that all this has not yet received definite confirmation and that, for the time being, it is not sufficient to lead us to change our plan of action.

year, meanwhile always keeping a watch on the variations in the serum reaction.

II. SECONDARY SYPHILIS.—If treatment is begun only after the secondary symptoms have appeared, with a definitely positive Bordet-Wassermann reaction, the treatment should be carried out persistently and continuously for the first two years, and arsenical and mercurial medication may advantageously be combined.

Generally it is well to begin with a rather vigorous course of treatment (4 to 6 grams of neoarsphenamin), followed soon after by a course of mercury.

At the least indication that the arsenical treatment is poorly borne, however, and especially in the presence of nervous disturbances, the doses of neoarsphenamin should be materially reduced. If necessary, the treatment may be limited to injections of 0.15 gram repeated oftener and continued for a longer time. One might, before giving up arsenic, replace the neoarsphenamin by sulfarsenol, or better, by acetylarsan.

The treatment should always be administered under the guidance of repeated serum tests. The variations in the reaction and its tendency to become negative will serve as a basis for the determination of the rest periods, which are made progressively longer. Some observers, *e.g.*, Vernes, consider that an interval of eight months between two properly conducted negative Wassermann tests permits of regarding recovery as permanent.

In our estimation, whatever be the results of the serum reaction, it is well to continue, for the first few years, either bismuth treatment (one or two courses of injections a year), or mercurial treatment, giving at least twice yearly a course of gray oil injections (four to six), and in any case observation of the serum reaction should be continued.

It is also advisable to combine with the antisyphilitic treatment proper the use of an iodide—two courses a year, on an average, each of three to four weeks' duration.

III. TERTIARY SYPHILIS.—(a) **Latent tertiary syphilis without apparent symptoms.**—If one is dealing with improperly or insufficiently treated patients, presenting no evidences other than a positive Wassermann reaction, it is advisable to begin the entire treatment over again, cautiously and in reduced dosage, and to treat the case as though it were one of secondary syphilis.

Accordingly, one should proceed with a series of alternate courses of arsenic and bismuth or mercury. The serum reaction should be

followed without too much hope of seeing it become negative, but the patient should be convinced of the utility of treatment, which is capable of protecting him from the late visceral and nervous complications.

(b) **Tertiary syphilis with skin manifestations.**—Even more than in the preceding condition, there is need here of taking up again the arsenic and mercury treatment, without forgetting the iodides, the beneficent action of which is often obvious in these cases. Arsphenamin or bismuth should constitute the foundation of the “attack” treatment of the lesions, while mercury will insure consolidation of their effects.

(c) **Nervous syphilis.**—In all syphilitics the advent of nervous disturbances should be watched for with the greatest care, the physician holding himself in readiness to act at the least sign of trouble.

Here, however, the treatment must be applied with great caution. Sicard’s method of injecting neoarsphenamin in small, frequently repeated doses appears to us preferable. It should be combined with mercurial treatment in the form of inunctions, suppositories, injections of gray oil, or even mercury cyanide intravenously, as well as with bismuth, which seems to be particularly active against nervous lesions.

(d) **Syphilis of the heart.**—Cardiac syphilis is not a contraindication to the arsenical compounds. Obviously, however, these should be availed of only with caution and restricted to small doses continued for a sufficient length of time. Bismuth is particularly serviceable in syphilis of the vessels.

IV. CONGENITAL SYPHILIS.—The treatment of congenital syphilis and of infantile syphilis has of late years been the subject of considerable discussion.

In the opinion of almost all pediatricists and syphilographers, the *newer arsenical compounds* are possessed in these cases, as in the adult, of unquestionable superiority.

Neoarsphenamin and *sulfarsenol* are the remedies of choice.

They are employed preferably by intravenous injection, into the episcranial veins.

The dose to be injected is, in general, 0.01 to 0.015 gram diluted in 2 cubic centimeters of double distilled sterile water, freshly prepared, without ever exceeding 0.1 gram in a child weighing more than 5 kilograms (11 pounds), i.e., as a total dose, below one year, 0.02 gram, and increasing only gradually according to the tolerance of the child.

The *subcutaneous* (not intramuscular) route of injection is advocated by some (Pinard and Giraud, Roccaz). The first injection should consist of 0.0025 gram per kilogram (2.2 pounds) of body weight; the second, of 0.005 gram; the third, 0.0075 gram; the fourth and succeeding injections, 0.01 gram. These injections, if well borne, are to be given at the rate of two each week. The drug is simply dissolved in a little double distilled water; the injection is carried out slowly and *very accurately into the subcutaneous cellular tissue*.

The *rectal route* is advised by Lesné in the form of *suppositories*—0.01 gram per year of age, twice a week.

1. *Neoarsphenamin* and *sulfarsenol* have a more rapid effect and are usually better tolerated.

2. *Bismuth*, increasingly used, seems to yield here the same results as in the adult.

Some give preference to the iodoquinat; others, to the hydroxide of bismuth. The dose to be injected is one-twentieth of the adult dose for each year of the child's age. In the nursling, *soluble benzo-bismuth* seems to us *preferable to the insoluble preparations*, which often leave indurated nodes.

3. *Mercury* remains a most valuable antisyphilitic agent, to be used, according to the case, in the form of rubs of mercurial ointment, ingestion of a 1:1000 mercury bichloride solution, or injections of mercury cyanide, 0.005 to 0.01 gram.

4. In *early inherited syphilis* (lesions of the skin, mucous membranes and viscera in the first few months or years of life), treatment should be energetic and may, according to Renaut, be summed up thus:

Attack treatment:

Ten weekly intravenous injections of neoarsphenamin in a maximum dose (about 0.0133 gram per kilogram—2.2 pounds—of body weight).

One month's rest.

Ten more injections in the same dose.

Three months' rest.

Ten more injections in the same dose.

Six months' rest.

Ten more injections.

Six months' rest, etc., until the Wassermann is negative.

The children generally bear this arsenical treatment admirably, and the results are in most cases excellent.

In *late inherited syphilis* (generally manifested by late tertiary lesions in patients from 3 to 28 years of age):

Mild arsenic, bismuth and mercury treatment, adapted to the course of the disease, but continued for a minimum of one year.

A course of ten weekly injections of neoarsphenamin in increasing doses (0.0033 to 0.0133 gram per kilogram).

A course of fifteen intravenous injections of 0.005 to 0.01 gram of mercury cyanide, according to tolerance.

A course of twenty injections, twice weekly, of benzo-bismuth at the rate of 0.005 gram of metallic bismuth per week and per kilogram of body weight.

The courses of injections should vary in frequency according to the obstinacy of the symptoms and of the Wassermann results.

It should not be forgotten that inunctions of mercurial ointment and the ingestion of 1:1000 mercury bichloride solution have also yielded unquestionable results.

The iodides and iodotannic preparations are worthy of attention as adjunct measures.

The treatment should be continued for a long time—at least four or five years, and from time to time until the child has grown up; the treatment should be completed with “maintenance” courses. “It is better to sin through excess than through lack, if one wants to avoid the late symptoms” (Lacapère).

SYPHILIS AND PREGNANCY.—Pregnancy not only does not contraindicate antisyphilitic treatment but, on the contrary, demands that such treatment be applied energetically, though with caution.

First Possibility.—**The father alone is syphilitic.**—In such cases it is well, even if the father has been treated before conception, to have the mother undergo a prophylactic course of treatment. One or two series of injections of gray oil in the course of pregnancy in a healthy woman, or even one or two courses of arsenic, are capable of protecting the child from the manifestations of inherited syphilis.

Second Possibility.—**The mother is herself syphilitic.**—The treatment of syphilis during pregnancy should be all the more energetic and intense in that:

1. Both the mother and child are threatened.
2. Tolerance of the pregnant woman to the compounds of arsenic and mercury is very great.
3. The mother may herself exhibit syphilitic manifestations.

The treatment should, on the whole, be that of syphilis, in general. It may be summed up as follows:

An initial course of weekly intravenous injections of ascending doses of from 0.15 to 0.9 gram (about 0.015 gram per kilogram of body-weight) of neoarsphenamin.

A second course of weekly intramuscular injections of gray oil corresponding to ascending doses of 0.04 to 0.08 gram ($\frac{2}{3}$ to $1\frac{1}{4}$ grains) of mercury, according to tolerance.

A third course of weekly intravenous injections of 0.3 to 0.9 gram of neoarsphenamin.

If the Bordet-Wassermann reaction is negative after this series of treatments, it will be justifiable to stop at this point; if not, it is advisable, if there is manifest tolerance, to continue the same treatment without hesitation.

SYPHILIS AND MARRIAGE.—Marriage of syphilitics should not be authorized until a sufficiently prolonged treatment (three to four years of consecutive treatment) has been given; in addition, no symptoms must have occurred for eighteen months or more.

The Wassermann reaction must be negative.

Lastly, before the marriage it is well to have the patient undergo a thorough course of arsenical and mercurial treatment, in order to protect him as much as possible from recurrences.

Where the infection has been treated vigorously and early, *e.g.*, beginning in the primary stage, marriage may be allowed much sooner, provided, however, the Wassermann reaction has remained negative for eight months after the last symptoms.

OUTLINE OF TREATMENT OF CONGENITAL SYPHILIS.

SELECTION OF THE SPECIFIC AGENT:

- | | | | |
|---------------------------|---|---|--|
| <i>Neoarsphenamin</i> .. | { | Quickly acting, generally well borne.
Serviceable doses: 0.0133 gram per kilogram.
Route of choice: Intravenous (epicranial); rectal (enemas).
Untoward results reported: Drug or disease? | |
| <i>Sulpharsenol</i> | | By subcutaneous injection: 0.01 gram per kilogram. | |
| <i>Mercury</i> | { | Time-honored remedy, easy to administer.
Inunctions of mercurial ointment (1 to 2 grams).
Ingestion of 1:1000 bichloride solution (1 to 2 cubic centimeters per year of age).
Suppositories of mercurial ointment (0.005 gram per year of age).
Intravenous injections of mercury cyanide (0.001 gram per year of age). | |
| <i>Bismuth</i> | | { | Bismuth hydroxide, bismuth iodoquinat in intramuscular injections. |

EARLY INHERITED SYPHILIS: Cutaneo-mucous and visceral lesions in the early months of life.—Early and energetic treatment.

Ten weekly intravenous injections (0.015 gram per kilogram) *if possible*, alternated with, progressively, 1, 2, 3, 4 months of rest, until the Wassermann is negative.

Duration of treatment: At least 4 to 5 years.

LATE INHERITED SYPHILIS: Late tertiary lesions at 3 to 28 years; various dystrophic states (hyposphysia, mitral stenosis, etc.).

Alternate arsenic and mercury treatments with iodide and iodotannic preparations as adjuncts, according to the clinical and serologic results.

OUTLINE OF TREATMENT OF SYPHILIS DURING PREGNANCY.

I.—The father alone is syphilitic, has been well treated, and the mother seems to be free of the disease.

- | | | |
|---------------------------|---|--|
| “Safety first” treatment— | { | Two courses of 20 suppositories of mercurial ointment (0.04 to 0.08 gram). |
| | | Or:
Two courses of 8 weekly injections of gray oil (0.04 to 0.08 gram). |
| | | Or:
Two courses of 6 weekly intravenous injections of neoarsphenamin (0.3 to 0.6 gram). |

II.—The mother is syphilitic.

Treatment must be energetic, for { both the mother and child are threatened.
tolerance of the pregnant woman in respect
of the arsenicals is marked.

The procedure should be that for syphilis in general. It may be summed up thus:

1st course: Eight weekly intravenous injections of neoarsphenamin (0.15 to 0.9 gram, according to tolerance; 0.015 gram per kilogram as maximal dose); one month's rest.

2d course: Eight intramuscular injections of gray oil (0.04 to 0.08 gram, according to tolerance); one month's rest; or twelve injections of quino-bismuth.

3d course: Eight weekly intravenous injections of neoarsphenamin (0.3 to 0.9 gram).

OUTLINE OF TREATMENT OF A CASE OF SYPHILIS OF MEDIUM SEVERITY.

	NEOARSPHENAMIN.	BISMUTH.	MERCURY.	IODIDE.
1st year	1st course: As soon as the diagnosis is made: <i>Ten weekly intravenous injections of 0.15 to 0.9 gram (about 0.015 gram per kilogram) as maximum dose.</i> <i>One month's rest.</i> 2d course: <i>Six to eight injections of 0.3 to 0.9 gram.</i> <i>Two months' rest.</i> 3d course: <i>Six to eight injections of 0.3 to 0.9 gram.</i> <i>Three months' rest.</i>	1st course: Immediately after the neoarsphenamin: <i>12 to 15 injections of benzo-bismuth or 12 of quino-bismuth.</i> 2d course: After the second course of neoarsphenamin.	TWO COURSES OF MERCURY between the 2d and 3d and after the 3d course of neoarsphenamin: <i>20 to 25 intravenous injections of mercury cyanide (0.01 to 0.02 gram).</i> Or: 20 intramuscular injections of mercury bismuth iodide (0.02 to 0.05 gram). Or: 25 suppositories of mercurial ointment (0.04 to 0.08 gram). Or: 8 to 10 weekly injections of gray oil (0.05 to 0.1 gram).	
2d year	<i>Two courses of six to eight weekly intravenous injections of 0.3 to 0.9 gram.</i>	TWO COURSES OF BISMUTH.	TWO COURSES OF MERCURY of 15 to 20 days' duration.	FOUR COURSES OF IODIDE (2 to 4 grams) combined with the courses of mercury.
3d and 4th years ..	<i>Two courses of six weekly injections of 0.3 to 0.6 gram.</i>	TWO COURSES OF BISMUTH.	ONE COURSE OF MERCURY of 15 days' duration.	TWO COURSES OF IODIDE (2 to 4 grams) combined with the courses of mercury.
5th, 6th and 7th years	Discontinue treatment if clinical and serologic examinations have been negative for at least a year.			
8th, 9th and 10th years	One course of six weekly injections of neoarsphenamin, 0.3 to 0.9 gram. One course of bismuth: Nine injections of quino-bismuth. One course of iodide and mercury of 15 to 20 days' duration.			

DISEASES OF THE SKIN.

(Written with the collaboration of DR. MARTINGAY.)

GENERAL DERMATOLOGIC THERAPEUTICS.

INTERNAL TREATMENT.—The respective importance of the general and the local treatment in skin disorders is no longer a subject of discussion. A few skin conditions the causative agent and pathogenesis of which are known are actually amenable to a causal form of treatment. Other conditions of still obscure etiology are, however, increasingly appearing to us, not as separate morbid entities, but as manifestations of some complex general disturbance, itself accompanied by visceral disorders, and developing on a subsoil influenced by inherited or acquired tendencies or general or local predisposing factors.

General Hygienic Measures.—During the course of a skin disorder, and even after recovery, it is important, in order to obviate recurrence, to keep a watch over the patient's general hygiene; to prescribe exercise, gymnastics, walking and open air life; to forbid physical or mental overwork and excesses of all kinds; to correct errors relating to the clothing and the care of the hair; in short, to insist, without neglecting any detail, on a regular mode of life that excludes all causes of irritation or depression of the nervous system.

Hygiene of the Skin.—Proper care of the skin and scalp must be insisted on by the practitioner, who is called upon to counteract both uncleanliness and its opposite, exaggerated cleansing. Whether the skin be dry or seborrheic, delicate or resistant, and wherever it is being considered, whether in the face, hands, feet or natural cutaneous folds, useful directions are to be given for the maintenance of its normal softness and its vitality.

The same is true in the case of the hair, the true hygiene of which is too often sacrificed to the empiric procedures of barbers or the caprices of fashion and vogue. The condition of the teeth is likewise not without its influence in certain skin disorders (eczema, alopecia).

Diet.—Alimentary hygiene makes up a considerable section of dermatologic therapeutics. The nature of the diet may be the cause of a skin eruption (toxic skin rashes of alimentary origin); in other cases, it may influence the course of a skin disturbance, either by a

direct action on it through the introduction of toxic material (irritable skin disorders: eczema) or by reacting on the general metabolic disturbance with which the skin condition is in most instances concomitant. Again, it is necessary to determine individual susceptibilities and to estimate the rôle that may properly be ascribed, in the presence of defective alimentary hygiene, to those obscure phenomena of idiosyncrasy and anaphylaxis, the pathogenic importance of which is daily being enhanced by new demonstrations. As a general rule, it is necessary in all skin disorders to interdict stimulating, irritating, fermented, preserved, salted, spiced, spoiled or acid foods, and to alternate between the various diets of low toxicity, *viz.*, restriction of fluids, milk diet, exclusive vegetable or milk and vegetable diet, chloride-free diet, etc., which should be instituted either continuously or intermittently. (See Part I: *Dietetics*.)

Medicinal Treatment.—The medicinal measures are not the exclusive property of dermatologic therapeutics and are generally derived from general medicine. Among them are the causal treatments relating to syphilis, the spirilloses, the mycoses, anthrax, leprosy and diphtheria; the treatment of infections by serums, vaccines and ferments, and the problematic treatments of tuberculosis and cancer. Other procedures, directed at the underlying diathetic state, endeavor to influence a constitutional condition such as arthritism, gout, obesity, diabetes, arteriosclerosis, nervousness, hepatism, lymphatism, etc. The visceral manifestations associated with skin disorders themselves call for symptomatic treatment. Hydrotherapy, climatotherapy, heliotherapy and thermal treatments act on the general condition in a way which is frequently very effective.

TREATMENT BY SURGERY AND PHYSICAL MEASURES.

—The surgeon is called upon to intervene in dermatology when the removal of a gumma, lupus lesion or tumor is required.

There is also to be mentioned a group of procedures which are being increasingly used in dermatologic work and the technical difficulties of which require, in some instances, a special training.

Electricity: Electrolysis, static electricity, high frequency.

Phototherapy: Light exposures, Finsen treatment in lupus.

Röntgen rays and radium, the resources of which are far from being exhausted.

The treatments by *Bier's hyperemia*, *hot air*, *massage* and *carbon dioxide snow*.

Dermatologists are also familiar with certain easily applied and commonly used procedures such as scraping or curettage, scarification, cauterization and epilation.

EXTERNAL TREATMENT.**A. Pharmaceutic Preparations. Excipients.**

1. **Water and aqueous solutions** are used as *washes* or simple or medicated *lotions*; in *sprays* exerting a gentle action which is favorable in the irritable skin disorders; in *wet dressings*, with or without a covering of oiled silk, and in *poultices* of potato starch—the latter being about the only substance used—which soften the epidermis. All these agents are detergent and decongestive.

General or local *baths* of plain water or water containing medicinal agents answer various indications. *Soothing and emollient*: Starch or bran baths; glycerin, linden or chamomile baths. *Detergent and fat-removing*: Alkaline baths, steam baths. *Stimulant*: Salt baths, arsenical baths (10 grams—2½ drams—of sodium arsenate in the bath), artificial sea baths. *Antiseptic*: Alibour's fluid (see further on, under *Weak Antiseptics*), zinc sulphate solution, potassium permanganate solution (1:20,000). *Sulphurous*: Generally a bath to which 30 to 100 grams (1 to 3½ ounces) of potassium polysulphide are added, or the Barèges bath, made up as follows: Sodium monosulphide and sodium chloride, of each 60 grams (2 ounces); sodium carbonate, 30 grams (1 ounce).

2. **Alcoholic solutions** or solutions made with ether, acetone, chloroform, benzine, carbon disulphide or carbon tetrachloride dissolve the fatty substances of the epidermis and insure permeability of the skin. These fluids, however, are often irritating.

3. **Powders** exert absorbent, desiccant, cooling and decongestive effects and have an isolating action. They may be of either vegetable or mineral origin, and those most commonly used are talc, zinc oxide, bismuth subnitrate, infusorial earth, wheat or rice starch and lycopodium. Powders enter into the composition of the *watery pastes*, the most widely used type of which is a mixture in equal parts of zinc oxide, talc, glycerin and water. These preparations, which enjoy high favor as vehicles for certain liquid or solid drugs used in dermatology, present the twofold advantage of being porous, *i.e.*, less occlusive than the ointments, and of being removable by simple washing. They are spread on the skin in a thin layer with a flat brush; the area is then dried by a free dusting of powder. They form a covering which does not stain the undergarments and requires no dressing.

4. **Glycerin** is an unctuous fluid which is frequently used in dermatology, as is likewise the glycerite of starch. It may be diluted with water in varying proportions; it evaporates slowly, and when applied as a dressing, presents the advantage of not macerating the

epidermis, thus tending to prevent the dissemination of germs (pyogenic dermatitis). A mixture of a bland powder and glycerite of starch constitutes an excellent paste which can be removed by simple washing.

5. The **fatty substances** remain, however, the usual vehicle for dermatologic remedies. Some fats of animal or vegetable origin, such as lard, spermaceti, cacao butter and many kinds of oil have the drawback of becoming rancid on exposure to the air. Lard must be used fresh; when benzoinated, it will keep, but on application it may be irritant. The fats derived from the hydrocarbons, vaselin, petrolatum or paraffin, are permanent; only a pure, neutral petrolatum should be used. Hydrated wool-fat or lanolin enjoys the advantageous property of being miscible with a certain amount of water.

These various fatty bodies enter into the composition of creams, pastes and ointments.

Creams.—The creams, including cold cream, are mixtures in varying proportions of a relatively non-irritant fatty substance, chiefly lanolin, with a certain amount of water, oil or aqueous substances. They act as emollients, and are appropriate for use over irritable skin. Lime liniment (carron oil) is a similar preparation, mild in action, which may serve as a menstruum for the majority of the active remedies.

Pastes.—Pastes are prepared by the addition to one or more fatty substances of a large proportion ($\frac{1}{3}$, $\frac{1}{2}$ or $\frac{2}{3}$) of a powder, yielding either hard pastes or soft pastes. Bland and soothing when used pure, these preparations become more active if a small amount of a solid or liquid drug is incorporated in them.

Ointments.—Ointments are made up of one or more fatty substances to which is added an active drug, with or without the further addition of a small amount ($\frac{1}{10}$) of a powder.

6. The **occlusive preparations** comprise all the varieties of *plasters*, impervious and adhering to the skin, and the *glues* or soluble or insoluble *varnishes* (collodion), which are protective and antipruritic.

7. The **soaps** and all their medicinal variations are active, penetrating, but also irritating preparations.

B. External Dermatologic Treatments and Medicinal Agents.—

Following the above brief enumeration of the pharmaceutic preparations and excipients, it will be necessary to obtain a general view of the medicinal agents themselves, grouped according to their therapeutic effects.

Antiphlogistic Agents.—This form of treatment has for its purpose to allay the manifestations of pain, tension and burning; while combatting the inflammation it exerts emollient, cooling and resolvent

effects. Availed of in a very large number of skin disturbances, it affords a variety of resources to the practitioner. Lotions or sprays of plain boiled water or of vegetable infusions, *e.g.*, of chamomile flowers, elder flowers or linden flowers, may be used. Wet dressings are applied with water or alcohol, pure or diluted—the latter often very effective in lymphangitis. Starch baths and starch poultices, applied cold, exert an emollient effect. Powders have a cooling action. In all the acute skin inflammations and true dermatoses it is well to be cautious in the use of the preparations mentioned below.

Lime liniment or carron oil (a mixture in equal parts of lime water and linseed oil or oil of sweet almond) is, among the best borne preparations, less irritating than the creams, including cold cream, which turn rancid easily.

Darier recommends the following three bland preparations:

Aqueous Pastes:

- (1) ℞ Zinci oxidi,
Talcii purificati,
Glycerini,
Aquæāā partes æquales (by weight).—M.
- (2) ℞ Zinci oxidi,
Calcii carbonatis præcipitati,
Glycerini,
Liquoris calcis,āā partes æquales (by weight).—M.

Cream ("vasolanolin"):

- (3) ℞ Petrolati 10 grams (3iiss);
Adipis lanæ anhydrosi 5 grams (gr. lxxv);
Aquæ rosæ,
Aquæ laurocerasi,
Liquoris calcisāā 5 c.c. (℥ lxxx).—M.

The two pastes are applied with the brush, allowed to dry, and covered with a dusting powder. If an active drug, solid or liquid, is to be incorporated in them, it is necessary not to disturb the equality of the fluid and pulverulent portions of the formula. The "vasolanolin" has the advantage of being permanent. Pure fresh lard, without benzoin, often exerts a remarkable sedative action.

When the inflammation has yielded, the following pastes may be used:

Lassar's Hard Paste:

- ℞ Zinci oxidi,
Amyli,
Petrolati,
Adipis lanæ hydrosiāā partes æquales (by weight).—M.

Unna's Soft Paste:

- ℞ Zinci oxidi,
Cretæ præparatæ,
Olei lini,
Liquoris calcisāā partes æquales (by weight).—M.

Glycerite and Ichthyol Paste (Darier):

- ℞ Kaolini,
Magnesii carbonatisāā 15 grams (℥ss);
Glyceriti amyli 70 grams (℥3xv);
Ichthyolis 3-5 grams (gr. xlv-lxxv).—M.

Weak Antiseptics.—These are used in washes or sprays or as dressings. Among them are: Boric acid solution (4 per cent.), diluted hydrogen peroxide solution ($\frac{1}{6}$ to $\frac{3}{10}$ of the full strength solution) and Delbet's cytophyllactic solution (crystalline magnesium chloride, 25.85 grams—399 grains—in 1 liter of water). *Alibour's fluid*, diluted to one-third or one-fourth of its original strength, is the best, most active and least irritating antiseptic solution. There are many different formulas for it, of which the following is recommended by Sabouraud:

- ℞ Aquæ destillatæ 1 liter (℥3xxxiv);
Spiritus camphoræ 1.5 c.c. (℥xxiv);
Cupri sulphatis 1 gram (gr. xv);
Zinci sulphatis 4 grams (℥j);
Tincturæ croci (N.F.) 0.5 c.c. (℥viii).—M.

Mild antiseptic baths are sometimes very useful. *Alibour's fluid* or 20 to 40 grams (5 to 10 drams) of zinc sulphate may be added to the bath water. Balzer recommends potassium permanganate, 0.05 to 0.2 gram ($\frac{3}{4}$ to 3 grains) to the liter of water, and De Hérain, copper sulphate, 0.1 gram ($1\frac{1}{2}$ grains) to the liter.

The various iodine preparations are used in applications or painted on: Tincture of iodine (irritant), iodine-acetone (2 to 5:20), iodine-chloroform (1 gram—15 grains—in 15 cubic centimeters— $\frac{1}{2}$ fluid-ounce); iodine-iodide solution (1 part of iodine and 2 parts of potassium iodide in 300 parts of water), and the oily preparations, such as oil and guaiacol (equal parts), gomenol in oil (5 to 20 per cent.), and camphor-iodoform in oil (camphor, 10; iodoform, 3; oil, 100).

In dusting powders iodoform, thymol iodide (aristol) and bismuth subgallate (dermatol) may be used, or the compound powders, such as:

Alibour's Powder (for pyogenic dermatitis).

- ℞ Cupri sulphatis 0.05 gram (gr. $\frac{3}{4}$);
Zinci sulphatis 0.1-1 gram (gr. iss-xv);
Talcii purificati 100 grams (℥iiiss).—M.

Lucas-Championnière's Powder (for ulcers and bedsores).

℞ Iodoformi,	
Benzoini pulveris,	
Cinchonæ loxæ,	
Magnesiæ carbonatis	āā 100 grams (3xxv);
Olei eucalypti	13.5 c.c. (f3iiss).—M.

Vincent's Powder (for wounds).

℞ Calcis chlorinatæ	10 grams (3ii½);
Acidi borici pulveris sicci	90 grams (3iij).—M.

Finally, various antiseptics may be incorporated in the creams, pastes and ointments, *e.g.*, yellow oxide of mercury (5 to 10 per cent.), ammoniated mercury (1 to 10 per cent.), camphor (1 per cent.), boric acid (5 to 10 per cent.), salicylic acid (1 to 2 per cent.), resorcinol (1 to 2 per cent.) and betanaphthol (0.5 to 1 per cent.).

Alibour's ointment, like Alibour's fluid, is a very effective preparation (see *Pyogenic Dermatitis*).

Strong Antiseptics.—These are preparations the use of which is sometimes attended with risk; a few compound preparations are used, but only to a limited extent.

Reclus's Ointment (modified by Brocq) (for ulcers).

℞ Phenolis,	
Acidi salicylici	āā 1 gram (gr. xv);
Resorcinolis	2 grams (3ss);
Camphoræ (tenuiss.),	
Antipyrinæ	āā 5 grams (gr. lxxv);
Balsami Peruviani	7 c.c. (ᵐcx);
Vaselini (Chesebrough)	81 grams (3xxj).—M.

Lucas-Championnière's Ointment (for wounds and burns).

℞ Sodii naphtholatis	0.3 gram (gr. v);
Olei thymi,	
Olei geranii,	
Olei verbenæ,	
Olei origani	āā gtt. xv;
Petrolati	100 grams (3iiss).—M.

Mencière's Fluid (for wounds and ulcers).

℞ Iodoformi	1 gram (gr. xv);
Balsami Peruviani,	
Guaiacolis	āā 1.1 c.c. (ᵐxix);
Eucalyptolis	0.9 c.c. (ᵐxv);
Alcoholis	12 c.c. (f3iij);
Ætheris	140 c.c. (f3iv¾).

M. Sig.: To be painted over the lesion.

A Compound Oil employed in cold abscess and tuberculous swellings (*Calot type*).

R. Guaiacolis	1.1	c.c.	(m̄xix);
Creosoti	2.15	c.c.	(m̄xlj);
Iodoformi	9	grams	(gr. cxi);
Betanaphtholis camphoratæ (1:2)	20	c.c.	(f3v);
Ætheris	47	c.c.	(f3xii);
Olei sterilisati	37	c.c.	(f3x).—M.

Antipruritics.—See treatment of *Pruritus*.

Exfolients. Detergents. Keratolytics.—These drugs are used in scaly, crusted disorders and in all the keratoses. Among the procedures availed of are alkaline baths, sulphur baths, and especially, vapor baths, which have the advantage of being non-irritating. Lotions and washes with soft potassium soap or with a medicated soap (containing ichthyol, salicylic acid, tar, quillaja or sulphur), and inunctions with some fatty substance or soap ointment or 5 per cent. salicylic ointment are other agencies belonging in this group.

Reducing Agents.—The reducing agents are substances having an affinity for oxygen. Some are weak reducers, and as such are antiseptic, vasoconstrictor and antipruritic. Others are strong reducers and exert an irritant, exfolient action.

WEAK REDUCING AGENTS.—Ichthyol, tumenol, thiol, thigenol, coal tar, pine tar, oil of cade, mercury salts, resorcinol, sulphur and sulphides.

STRONG REDUCING AGENTS.—Pyrogallol and chrysarobin.

These drugs are incorporated in aqueous, alcoholic or ethereal solutions, or in pastes, ointments or soaps. Sulphur is used in a suspension in water or in alcohol. Ichthyol and thigenol are the only tars that are soluble in water.

Oil of cade is used in the form of a weak or strong glycerite (see *Psoriasis*). The pastes and ointments of oil of cade, with sulphur or ichthyol, strong or weak, are subject to very many variations.

Stimulants and Rubefacients.—These include the alcohols, tinctures, ether, chloroform, camphor, mustard, iodine and acids.

Antiparasitic Agents.—See *Parasitic Skin Diseases*.

Caustics.—Nitric acid, lactic acid, chromic acid, arsenous acid, caustic potash, zinc chloride, mercury bichloride, acid nitrate of mercury, pure phenol, resorcinol, pyrogallol, potassium permanganate, formaldehyde and silver nitrate.

THERAPEUTIC RULES.—To carry out effective and proper dermatologic treatment, certain fundamental therapeutic principles should be mastered.

The drugs and treatments used are very many; their forms and modes of application are very varied. The practitioner can do better than learn a few prescriptions, apply them indiscriminately, and expect always the same results.

In dermatology, just as in general medicine, one is dealing not with diseases, but with patients; there are few simple cases, but many complex ones.

1. Necessity of General Treatment.—The constitutional treatment should be based on a careful study of the etiology of the case, analysis of the predisposing, exciting and localizing causes, and on an investigation of the "subsoil" and concomitant disturbances.

2. Management of the Local Treatment.—"Good dermatologic treatment can be effected with a very restricted number of procedures and drugs" (Darier), provided the effects of these agents are known and their mode of application understood.

Cleansing of the Lesions.—This is the first step in all dermatologic treatment: The skin lesion must be thoroughly cleansed and exposed; in short, freed of all epidermal or other detritus with which it is covered. To apply a plaster over a crusted area or an ointment over a lesion covered with thick scales is to doom to failure even the most reliable and appropriate treatment.

Selection of the Pharmaceutic Preparation.—It is indispensable, before making use of a drug, to come to an intelligent decision as to the form in which it shall be prescribed—whether as a lotion, powder, ointment, cream, plaster, etc. The same active substance may have different effects, not only according to its concentration, the duration of its application and the region over which it is applied, but also according to the vehicle employed.

In addition to the evaporation of the sweat, the skin is the seat of a slight, imperceptible, constant evaporation taking place through the pores of the sudoriparous and follicular orifices and also through the epidermal outer covering. This function, designated as the *insensible perspiration*, takes part in the regulation of the general body temperature and possesses a physiologic importance of the first order. In considering the effect of a given kind of pharmaceutic preparation on the skin, it is necessary to know not only the degree of penetration through the epidermis it represents and the important effect it produces on the circulation through the dermis, but also whether it hinders or favors perspiration.

In general, these three effects are interrelated in some respect or another. A menstruum may be at the same time *permeable* and cooling;

vaso-constrictor, i.e., decongestive, and also capable of affording the active agent a *limited amount of penetrating power*.

This is the case with the *pastes*, which are porous by reason of the powder they contain, which absorb the discharges, and which are appropriate for irritable skins and inflammatory lesions. Their action, wholly superficial, is chiefly soothing rather than curative. The permeable bases, which enjoy the additional property of being occlusive (zinc glue made with gelatin), are choice antipruritic agents.

In regard to this first variety, there exists a second category of bases which are *impervious* and occlusive, and hence heating, *penetrating deeply* in the epidermis, *vasodilator* and congestive; these properties favor interchanges between the skin and the drug incorporated in the preparation. Such preparations are the ointments and plasters, recommended for use over non-irritable skins and non-inflammatory lesions.

All dermatologists rightly lay stress on the importance of the selection of the menstruum and on the necessity, according to the patient and the lesion, of varying the modes of application of each remedy rather than the remedies themselves.

The Test of Skin Sensitiveness.—"In deciding upon the dosage and the pharmaceutic form, one should endeavor to combine the maximum of therapeutic activity with the maximum of tolerance" (Gougerot). It is necessary, indeed, to determine the local reactions of the patient and spare the susceptibilities of his skin surface. This can be accomplished by using the drug selected in weak dosage and on a limited portion of the lesion to be treated. One may also employ the "two-jar method," recommended by Gougerot, one jar containing an active preparation and the other an inert preparation, the second being used for dilution of the first in order to secure a progressive action. It is of interest to group the pharmaceutic forms in the order of their therapeutic potency and tolerance; the following synopsis illustrates this point of view:

ACUTE INFLAMMATIONS.	SUBACUTE INFLAMMATION. LESION LESS IRRITABLE.	NON-INFLAMMATORY CONDITION. LESION NON-IRRITABLE.
LESION IRRITABLE.		
Either the moist method: Lotions, sprays, wet dressings, poultices.	At the start: Lime liniment, lard, creams, vasolanolin, simple pastes.	In the order of intensity: Ointments, plasters, collodions, traumaticin, soaps.
Or aqueous pastes: Lime liniment, powders, pure lard.	Then: Creams and pastes containing active ingredients.	

TREATMENT OF THE COMMONER SKIN DISORDERS.

ECZEMA AND PITYRIASIS ROSEA.

Eczema, considered as a whole, comprises a group of important skin conditions presenting an extremely large number of symptomatic forms, localizations, clinical features, and etiologic and pathogenetic varieties.

Two main factors illuminate the treatment of eczema:

1. The factor of **constitutional tendency** or "soil," which, more than in any other disorder in clinical medicine, must engage the attention of the practitioner: The patient, with his diathetic "temperament," his pathologic impairments, and all the disturbances of function that may be present in his various body systems, must be treated on his own account, in the absence of any demonstration that the skin condition has been brought on or influenced by the presence of these morbid manifestations. Eczema finds in profound changes in the "soil," if not an exciting cause, at least a predisposing cause of the first order.

Some observers have reached the point of considering the constitutional treatment of eczema as overshadowing the local treatment.

2. The factor of **irritability**, with which are connected certain clinical features of the first importance. Eczema is in the majority of instances dependent upon some form of EXTERNAL IRRITATION, whether the latter be acting primarily on a diathetic soil subject to eczema (eczema of external causation, artificial or occupational), or whether this soil be prone to eczematous response by reason of some complex general toxic state, the external irritation acting secondarily to initiate the eczema and direct it to certain areas (eczema of internal causation). For practical purposes, all the cases fall into either the one or the other of these two categories in which the factor of *irritation*, primary or secondary, principal or accessory, plays an effective rôle.

Furthermore, the eczematous subject is one whose skin is essentially IRRITABLE. In no case can one foresee the degree of tolerance of an eczematized skin; unless the local treatment is instituted cautiously, the eczema reacts to the drugs, as to any other cause of irritation, by a recrudescence of the eruptive and inflammatory condition.

Local treatment is possible, then, only on condition:

1. *That all external sources of irritation be removed.*
2. *That the susceptibility of the patient be determined by graduating the remedial action in a slow, progressive manner.*

3. *That the attendant be convinced that there exists no method nor formula which is applicable to all varieties of eczema and to all stages in its course.*

Shall Eczema Be Treated?—This question should no longer be asked.

Every case of eczema should be treated directly upon the appearance of the eruption, and the physician's endeavors should be directed toward limiting its extent, reducing the inflammatory manifestations and hindering secondary infection.

The majority of observers, however, on account of certain compensatory phenomena (appearance of a serious organic disorder in concomitance with the rapid disappearance of eczema; "metastasis"), now agree that it is imperative to exercise caution and mildness (emollient moist dressings, bland topical applications) in the treatment of acute or very extensive eczema coming on in gouty, rheumatic, arteriosclerotic, nephritic or asthmatic subjects or in those suffering from chronic bronchitis with emphysema. Infantile eczema also belongs in this category. In these cases it is necessary to institute beforehand a course of general treatment of the concurrent morbid manifestations. Indeed, in all forms of acute eczema, and for the first few days, it is well to exercise similar caution in the local treatment.

In case the dreaded metastatic conditions actually arise, application of a selected counterirritant (mustard plaster) to the skin is generally sufficient to cause re-appearance of the eczema and bring about relief from a variety of alarming general disturbances quite remote from the skin lesion and having no apparent relationship to it.

General Treatment.—This comprehends all the procedures of general medicine, applied to meet certain indications. At the start the patient must be detoxicated by being restricted to water, then to a milk diet, by promoting intestinal elimination with laxatives and urinary elimination with diuretics, and by withdrawing small quantities of blood, followed by injections of small amounts of weak sodium chloride solution. Rest, change of air, a vegetable or chloride-free diet, and the resources of digestive and diuretic medication, as well as those affording a tonic or a sedative effect on the nervous system and heart, should be judiciously availed of.

Organotherapy is made use of in glandular insufficiencies. Frequent uranalyses should be carried out. Every kind of temperament is to be cared for on its own merits.

Treatments at mineral springs are of varying types. They are directed to the general condition (lymphatism, gout, asthma, etc.)

and may promote recovery from the skin disorder or prevent its return.

Local Treatment.

Acute Eczema.—The inflammatory and hyperemic element in the disorder is to be subdued: The patient should be placed at complete rest, and the local lesions either sprayed three or four times a day or covered with loose wet dressings following closely the outline of the eczematous patch and not extending beyond it. The dressings, sprays and brief, frequently repeated local washings should all be carried out with boiled water, plain or with the addition of elder or chamomile flowers or poppy heads. The best resolvent measure is a starch poultice, prepared hot, applied cold and frequently renewed. In the event of failure, free dusting with powders of mineral or vegetable origin, or inunctions of creamy preparations (fresh cold cream without benzoin or rose water), or soft pastes such as fresh lard (without benzoin), at first pure and then with addition of 10 per cent. bismuth subnitrate or 2 per cent. of pure tannic acid, may be employed. A dusting powder should be used over the creams or pastes.

Sluggish Eczema.—In these cases the use of the bland preparations such as aqueous pastes, Lassar's paste or Unna's soft paste should be resumed whenever the eczematous area seems to become irritated and threaten to return to an acute state. If the lesion weeps and itches, it should be painted every three or four days with a 2 to 5 per cent. solution of silver nitrate; after this has dried on, the reducing topical agents are applied.

If the lesion is dry and scaly it should be cleaned with a wet dressing or with petrolatum or benzin, and one of the various reducing agents, singly or combined in the same preparation, applied, *e.g.*, oil of cade (1 to 25:100); pine tar, ichthyol, thigenol, tumenol or thiol (5 to 20:100); washed precipitated sulphur; salicylic acid (1 per cent.); calomel (1 to 5 per cent.); yellow oxide of mercury (1 to 3 per cent.); tannic acid, resorcinol or betanaphthol (1 to 2 per cent.). Some of the more complex combinations, though possessed of a disagreeable odor, are very effective through the combined action of several reducing agents. In all cases, caution in the treatment should be exercised; the "two-jar method" should be used, one jar containing the reducing formula and the other an inert preparation such as:

Paste.

℞ Zinci oxidi,
Talcī purificati,
Olei (olivæ)āā partes æquales.—M.

Foamy Cream.

R. Magnesii carbonatis,			
Adipis lanæ anhydrosi	āā	10 grams	(3iiss);
Olei amygdalæ dulcis		11 c.c.	(f3iij);
Aquæ		50-60 c.c.	(f3xiiij-xvj).—M.

Thick Cream.

R. Magnesii carbonatis,			
Adipis lanæ hydrosi	āā	20 grams	(3v);
Olei amygdalæ dulcis		43.5 c.c.	(f3xj);
Aquæ		40 c.c.	(f3x).—M.

By means of this two-jar procedure a progressive mixture of the inert preparation and reducing ointment is readily obtained.

Mention should also be made of the use of *coal tar* [*Pix carbonis*, N. F.], which may be incorporated in an ointment, but is sometimes used pure. It is a perfect antipruritic. It is applied with a flat brush and causes a slight burning which lasts for a half hour; it is allowed to dry for an hour, a dusting powder then applied, and the whole covered with fine fabric. On the succeeding days the dressing is watched and more tar added over places where the original coating has peeled off. This treatment, which is perfectly borne in some subjects, will cure eczema in about ten days; in other cases it may be irritating and harmful.

The refractory and chronic, pruriginous, hyperkeratotic, infiltrated, lichenoid, hypertrophic or papillomatous cases are benefited by a few X-ray treatments and should be treated like the keratoses, lichen simplex, etc.

Infected Eczema.—Such a condition should not be treated at the start like a simple pyogenic dermatitis, as this would entail risk of causing irritation. The measures to be employed are baths, sprays, moist dressings, powders, and a little later the mild antiseptics, such as Alibour's cream (see *Pyogenic Dermatitis*), application of which should be limited to the infected area, the remaining parts of the lesions being protected by a zinc paste.

Eczema of Special Regions.—Eczema of the lids, nostrils or lips should be dealt with by means of the milder procedures.

Eczema of the natural folds, perineum, anus, vulva and scrotum should be subjected to detergent, cleansing, soothing and, especially, nitrate treatment.

Eczema of the scalp, after cleansing, should be rather promptly subjected to active treatment (oil of cade, sulphur, camphor).

Eczema of the extremities (hands, feet) calls for rest of these parts in the horizontal position.

Pityriasis rosea is a mild type of eruption, irritation of which should be carefully avoided and which in the majority of cases is recovered from spontaneously.

Powders, creams and zinc paste should be preferred to baths or strong ointments in these cases, and above all, the general disturbances (digestive disturbances, nervous state) nearly always at the bottom of the skin disorder should be corrected.

PSORIASIS AND OTHER NON-IRRITABLE SKIN DISORDERS.

General Treatment.

Many remedies have been recommended in the constitutional treatment of psoriasis. *Arsenic* is prescribed in all its forms, by the mouth or by hypodermic injection. *Arsphenamin* in small doses is well borne. Large doses of sodium cacodylate by intravenous injection have given good results: 0.5 to 1 gram ($7\frac{1}{2}$ to 15 grains) of the drug is injected every three or four days; this measure sometimes induces a certain amount of arsenical pigmentation. *Iodides* in large doses (5 to 15 grams—75 to 225 grains—a day) and the soluble mercurial salts have a favorable effect in the cases in which psoriasis is superimposed on congenital syphilis. The *phosphates*, the calcium salts and iron should be employed in cases in which there is observed a condition of demineralization, which may be, in turn, an indication of a torpid tuberculous process. *Sulphur* remains the remedy of choice: Given by the digestive route (sulphur and honey in equal parts, colloidal sulphur, or precipitated sulphur in pills) or administered in the form of intravenous injections of colloidal sulphur or intramuscular injections of sulphur in oil (an effective but painful method), it seems to have an effect on the course of severe cases of psoriasis and to antagonize with success the joint pains or chronic arthropathies often associated with this disorder.

Local Treatment.—Having recognized the existence of psoriasis, one should first ascertain whether it is not tending toward eczematization; it is then irritable and calls for the mild procedures employed in the treatment of eczema (sprays, dusting powders, lard and bismuth); this is, however, not the most frequent condition. In the majority of instances psoriasis has to be dealt with vigorously.

1. *Cleansing of the Lesions.*—This is an indispensable first step, for which should be employed prolonged alkaline baths, with the use of soap (soft or tar soap) or steam baths, which are very effective and entail no risk of irritation. With these measures may be combined inunctions of different fatty substances, alone or with addition of

keratolytic agents (salicylic acid, 5 per cent., or resorcinol, 5 to 25 per cent.).

2. *Use of Reducing Agents.*—These all produce a favorable effect. Those used should range from the weakest to the strongest. OIL OF CADE has for many years been in favor at the Hôpital Saint-Louis in Paris; it presents the disadvantage of being messy and malodorous, but there are now manufactured more or less deodorized and decolorized extracts, "lenicades" or "oxycades," which are preferred by the patients. Gougerot recommends three varieties of treatment which may be used together or separately.

For the night, the patient anoints his whole body, with the exception of the face, and the scalp if it is not involved, with a glycerite of oil of cade with the addition of 5 to 10 per cent. of sulphur. The glycerite should be prepared according to Vidal's formulas, first the weak, then the strong:

<i>Glycerite of Oil of Cade.</i>		<i>Weak.</i>	<i>Strong.</i>
R	Olei cadini veri	15 c.c. (f3ss);	50 c.c. (f3xiiij);
	Fluidextracti quillajæ		
	(q. s.)	3 c.c. (m̄xlv);	5 c.c. (m̄lxxx);
	Glyceriti amyli	72 grams (3xviii ss).	36 grams (3ix).
	Olei menthæ vel caryo-		
	phylli	q. s.	q. s.
M.			

Following is a paste which is well tolerated and is soluble and easy to clean off:

R	Acidi salicylici et aquæ (q. s. ad solv.) . . .	1-5 grams (gr. xv-lxxv);
	Zinci oxidi	50 grams (3xiiij);
	Sulphuris præcipitati loti	5-15 grams (gr. lxxv-3ss);
	Glyceriti amyli	50 grams (3xiiij);
	Olei cadini	20-50 c.c. (f5v-xiiij);
	Olei betulæ	3-5 c.c. (m̄l-lxxx);
	Fluidextracti quillajæ	q. s.
M.		(GOUGEROT.)

The patient keeps an undershirt and drawers on over night. It is necessary that the entire integument, including both the patches of psoriasis and healthy skin, should be covered by the ointment.

In the morning, an oil of cade bath, as described by Balzer, is taken. It consists of a very hot bath of one hour's duration in which is poured little by little, well shaken and emulsified beforehand, the following liquid:

R	Olei cadini	50-100 c.c. (f3xiii-xxvj);
	Olei betulæ	3 c.c. (m̄l);
	Vitelli ovi	1 vel 2;
	Fluidextracti quillajæ	10-20 c.c. (f3iiss-v);
	Aquæ	q. s. ad 500 c.c. (f3xviij).—M.

Three or four baths a week are generally well borne by the patient.

Wright's formula may likewise be used:

℞ Picis carbonis (N. F.)	40 grams (3x);
Tincturæ quillajæ,	
Alcoholis	āā 80 c.c. (f3xx).—M.

From 15 to 60 cubic centimeters ($\frac{1}{2}$ to 2 fluidounces) of this are poured into the bath. Twenty to thirty baths are required to cure an average case.

In the daytime, oil of cade, even in its deodorized forms, diffuses an unpleasant odor. There should, therefore, usually be substituted for it ointments of sulphur (10 per cent.), salicylic acid, camphor (1 to 5 per cent.), or calomel (2 to 5 per cent.). There are several formulas in which some of these agents are used in combination, *e.g.*:

℞ Acidi salicylici,	
Pyrogallolis	āā 2 grams (3ss);
Ichthyolis	5 grams (gr. lxxv);
Picis pini	10 c.c. (f3iiss);
Adipis lanæ hydrosi	20 grams (3v);
Petrolati	40 grams (3x).—M.
℞ Acidi salicylici	1-6 grams (gr. xv-xc);
Sulphuris præcipitati loti	8 grams (3ij);
Zinci oxidi,	
Talci purificati	āā 20 grams (3v);
Olei amygdalæ dulcis	30 c.c. (f3j).—M.
	(GOUGEROT.)

A 1 per cent. salicylic acid plaster can readily be worn beneath the garments.

The nocturnal oil of cade treatment is uncleanly and is repugnant to some patients; the day treatment is frequently incompatible with the patient's occupation; like the baths, it exposes him to acne, which must be cauterized with a 1 per cent. solution of methylene blue (Balzer). Nevertheless, the baths remain an easily applied treatment, from which good results are to be expected.

The *strong reducing agents* are employed in psoriasis over all infiltrated lesions which are refractory to the foregoing measures. They should be used only with caution, in but one region at a time, and over a small area. *Pyrogallol*, which is hard to manage, burns the body linen and blackens the epidermis, nails and hair; used over large surfaces, it entails risks of intoxication (urine to be watched for hemoglobinuria and albuminuria). *Chrysarobin*, a better drug, less toxic, staining the hair and linen a violet yellow, brings on intense and painful conjunctivitis when it comes in contact with the eyeball.

Some observers recommend reinforcing the effect of the oil of cade baths by the addition of 1 to 5 grams (15 to 75 grains) of chrysarobin or of pyrogallol. This should be done only with the most careful precautions; one should make sure that the patient has no organic defect, protect the mucous membranes with petrolatum, avoid wetting of the face and hair, and dry the body without rubbing. Chrysarobin is frequently used in stick form:

℞ Chrysarobini	10 grams (3iiss);
Petrolati,	
Ceræ albæ	āā 30 grams (3j);
Olei theobromatis	20 grams (5v);
Paraffini	10 grams (3iiss).—M.

or is painted on: After the lesion has been cleansed, two or three films of the following solution are applied over, but not beyond, the lesion with a flat brush: Chrysarobin, 5 grams (75 grains); ether, 62.5 cubic centimeters (17 fluidrams). When this has dried, it is covered over with two layers, extending slightly beyond the margins of the preceding application, of traumaticin:

℞ Gutta-perchæ	10 grams (3iiss);
Chloroformi	60 c.c. (f3ij).—M.

This last preparation can be removed with cotton moistened with chloroform.

Chrysarobin acts only when an erythema is produced at the margins of the patches of psoriasis treated with it. This erythema should remain of moderate intensity; otherwise, the application of the drug should be left off for a few days.

Radium and the X-rays have not yielded decisive and constant results in psoriasis.

Psoriasis in the sensitive regions (face, glans, penis) should be treated gently, while that of the scalp calls for careful preliminary cleansing. In these special varieties, sulphur, oil of cade, and the mercurials (yellow oxide, calomel, 2 per cent.) should mainly be used.

The treatment of psoriasis should be persisted in until the last lesion has disappeared, and continued for a few weeks after recovery; otherwise rapid recurrence may take place. At the close of the treatment it is advisable to accentuate the general measures (sulphur, arsenic) or to send the patient to a thermal resort.

The several varieties of *eczematides* of Darier, viz., *seborrheic eczema*, "*dermatose figurée médio-thoracique*," *sluggish*, *dry*, *pityriasisiform*, or *psoriasisiform eczema*, Brocq's *para-psoriasis*, some forms of *hyperkeratotic lichen*, *pityriasis rubra pilaris*, and *psoriasisiform microbic epidermitis* call for similar treatment.

PARASITIC SKIN DISEASES.

I. SKIN DISORDERS CAUSED BY ANIMAL PARASITES (ACARUS, BITING INSECTS).—A. Scabies.—The treatment consists in destroying the parasite and curing the associated lesions. Two varieties of scabies require consideration: Simple scabies and scabies with complications.

Simple Scabies.—The parasites are destroyed by various procedures, the most energetic of which is the sulphur rub, as it is practised at the Hôpital Saint-Louis. Considerable attention to detail is required in this procedure, which depends for successful results upon a series of well established procedures to be supervised by the physician: (1) The patient scrubs himself for half an hour with hot water and soap—either white or sulphur soap, or with soft soap diluted one-fourth with glycerin. The rub is then continued for another half hour in a lukewarm sulphur bath. Then, with a moist, coarse towel, all the areas where there are burrows (hands, feet, genitals) are well rubbed in order to break open the burrows; this is the most important step in the procedure. (2) After drying of the skin, the body is anointed and rubbed for twenty minutes with one of the following three ointments:

HELMERICH-HARDY OINTMENT (*irritant*).

℞ Sulphuris sublimati	10 grams (℥iiss);
Potassii carbonatis	20 grams (℥v);
Adipis	120 grams (℥iv).—M.

BOURGUIGNON'S OINTMENT (*mild*).

℞ Olei lavandulæ,	
Olei cassiæ,	
Olei menthæ piperitæ,	
Olei caryophylli	āā 2 c.c. (℥ss);
Tragacanthæ	4 grams (℥j);
Potassii carbonatis	30 grams (℥j);
Sulphuris sublimati	90 grams (℥iij);
Glycerini	144 c.c. (℥xxxviiij).—M.

FOURNIER'S OINTMENT (*mild*).

℞ Sulphuris sublimati	100 grams (℥iiiss);
Sodii carbonatis	50-100 grams (℥xiv-℥iiiss);
Glycerini	160 c.c. (℥vss);
Tragacanthæ	1 gram (gr. xv);
Perfume	q. s. —M.

The ointment is allowed to stay on, talcum powder applied, and, if the patient's skin is not sensitive, he is kept in this condition for twenty-four hours, at the most.

(3) On the next day, or as soon as a sensation of irritation sets in, a tub bath is taken, upon leaving which the patient is anointed with a soothing, antipruritic ointment, cream, cold cream or zinc paste in which has been incorporated an antipruritic such as camphor (2 per cent.) or betanaphthol (1 to 2 per cent.). These baths and the ointment are repeated on alternate days.

On the day of the "rub," all of the patient's clothing (including the tie, overcoat and gloves) are passed through the autoclave or treated with formaldehyde. It is well also to disinfect the mattress. The linen should be boiled in lye. The application of formaldehyde may be carried out in a wardrobe or trunk, and should be kept up for two to four days.

Convalescence occupies hardly less than a month, during which the attendant should be on the watch for a possible relapse and is called upon, in particular, to treat the post-scabic itching sometimes known as pseudo-scabies. In this condition the patient believes a relapse has occurred and very often the physician has insufficient evidence on which to base a decision in the matter. Under these circumstances, it is better to wait three weeks for obvious indications of recurrence of scabies than to carry out an unnecessary "rub" for post-scabic itching. Finally, a thorough investigation should be made among the patient's immediate associates, with a view to subjecting all those who may be infected to treatment on the same day as the patient. Any person sleeping in the same bed with a scabic individual should be systematically treated, and there is no need to wait until he develops the characteristic itching lesions; he is certain to be contaminated.

There are also *milder procedures*, to be applied to persons with sensitive skin, to those with pyogenic dermatitis, or to a pregnant woman and her child:

1. A rub from head to foot on four successive days with balsam of Peru, pure or diluted with alcohol to soften it, or mixed with an equal amount of lard. The patient spends the night with underwear, socks and gloves on, and allows the ointment to remain on during the day. A bath completes the treatment.

2. Rubs for a week with Darier's mixture:

R. Betanaphtholis	3-5 grams (gr. xlv-lxxv);
Balsami Peruviani	15 grams (3ss);
Styracis recentis,	
Cretæ præparatæ	20 grams (3v);
Adipis	40 grams (3x).—M.

3. In children and infants in whom sulphur is too irritating, mild lotions are used:

R ^x Balsami Peruviani	5 grams	(gr. lxxv);
Unguenti styracis*	25 grams	(ʒviss);
Olei olivæ	60 c.c.	(fʒij).—M.

In all these protracted treatments it is well to have the underwear disinfected twice, at the beginning and end of the treatment.

4. R^x Adipis lanæ hydrosi,
 Petrolatiāā 25 grams (ʒviss);
 Misce et adde:
 Sodii polysulphidi 5 to 10 grams (gr. lxxv-cl);
 Aquæ 20 c.c. (fʒv);
 Deinde adde:
 Zinci oxidi 0.5 gram (gr. viiss);
 Olei amygdalæ dulcis 20 c.c. (fʒv).
 Ft. sec. art.

This preparation should be used *without* preliminary baths or rubs. The whole body should be anointed with it before retiring on two successive evenings. The underwear is to be kept on during the application of the ointment.

Only these two applications are to be made.

On the day after the second application, a starch tub bath, with free use of soap, is taken.

The underwear and sheets should then be changed (EHLERS, MILIAN).

Scabies with Complications.—Before applying the anti-parasitic treatment, it is advisable first of all to allay the various forms of irritation that are superimposed upon scabies (eczema, pyogenic dermatitis, *q.v.*).

In these cases, the mild forms of treatment for scabies are called for.

B. Pediculosis.—Whatever the variety of pediculosis present, the treatment is fundamentally the same, though slight modifications are indicated in the different regions affected.

Pediculosis Capitis.—Where there is no complicating infection, the hair should be cut short in the male, while in women, it can always be allowed to stay. The hair and scalp are then moistened either with hot vinegar or with a pledget dipped in Sabouraud's mixture:

R ^x Xylolis	59 c.c.	(fʒxvj);
Alcoholis dehydrati	31 c.c.	(fʒviiiiss);
Ætheris	34.5 c.c.	(fʒixss).

M. Sig.: For external use as directed. Protect the eyes. Inflammable.

These preparations possess the twofold advantage of killing the parasites immediately and of loosening the nits by dissolving the

* The composition of the French styrax ointment is (by weight): Olive oil, 150; styrax, 100; colophonium, 180; elemi, 100; and yellow wax, 100.

material which binds them to the hair. The nits are then removed by careful combing with a fine comb.

INFECTED VARIETY (impetigo, eczema, folliculitis).—In these cases a thick layer of the following preparation should be applied to the hair:

R. Xylolis gtt. cl;
 Petrolati 150 grams (3v).—M.

and a suitable head dressing then applied, to be left on over night.

Next day, the fine comb is used to remove the crusts and nits, each complicating disorder is treated by appropriate measures (applications, antiseptics, ointments), and the procedure repeated for several consecutive days according to the abundance of parasites and the extent of the lesions.

Pediculosis Corporis.—This variety calls in particular for great cleanliness: Plain or sulphur baths with the use of soap, frequent changes of underwear, disinfection of the clothes by steam or by the use of the hot iron, with special attention to the folds and seams, or by copious spraying with a hydro-alcoholic solution of anisol [$C_6H_5OCH_3$] (alcohol and water, equal parts; anisol, 0.05 per cent.) or of oil of lemon-grass (5 per cent.). With the hydrotherapeutic measures may be combined the use of parasiticide solutions. The secondary lesions due to scratching or eczematization should receive appropriate treatment.

Pediculosis Pubis.—The use of mercurial ointment in the treatment of this condition has been given up. Preference is now often given to a lotion consisting of mercury bichloride, 1 gram (15 grains); vinegar, 250 cubic centimeters ($8\frac{1}{2}$ fluidounces), and glycerin, 40 cubic centimeters (10 fluidrams). Other serviceable preparations are Sabouraud's xylol mixture, which has the drawback of causing considerable burning, and ointments of calomel (2 per cent.) or of xylol (1 drop to 15 grams— $\frac{1}{2}$ ounce—of petrolatum). Darier recommends yellow ointment:

R. Hydrargyri oxidi flavi,
 Zinci oxidi āā 10 grams (3iiss);
 Acidi salicylici,
 Resorcinolis āā 1 gram (gr. xv);
 Petrolati 78 grams (3iiss).—M.

The same remarks as have already been made apply to the treatment of the secondary lesions.

C. Other Varieties of Insects.—*Bites of Fleas, Bedbugs, Mosquitoes, and Harvest Bugs.*—Protection from these insects can be obtained by rubs with tincture of benzoin or of eucalyptus. Their bites give rise to an itching eruption which may be allayed with applications of 1 per

cent. phenol in vinegar, benzine, or balsam of Peru, followed by the free use of dusting powders.

Ticks, including wood-ticks, should be killed with turpentine before they are pulled off.

II. SKIN DISORDERS CAUSED BY VEGETABLE ORGANISMS (FUNGI).—These may be divided into two groups, each comprising several varieties.

A. Deep Mycoses or Dermatomycoses.—These disorders, formerly but little known, and the protean manifestations of which have attracted the attention of recent investigators (de Beurmann, Gougerot), are still the source of many unfortunate mistakes in diagnosis (unnecessary amputations; patients believed syphilitic or tuberculous subjected to ineffectual treatment). These conditions, it may be recalled, are actually general infections not only leading to skin manifestations but sometimes involving the bones, joints, muscles, lymph-nodes, special sense organs and viscera. The clinician, henceforth, must make it a rule to look for a mycosis in all conditions that seem to suggest epithelioma, syphilis, tuberculosis or chronic suppuration. The diagnosis is confirmed by laboratory methods (cultures), which enable the observer to recognize an existing mycosis and identify its variety, and likewise by the test of antimiotic treatment.

Different species of deep mycoses are observed: *Sporotrichosis*, much the commonest and most amenable to treatment; *actinomycosis* and *nocardiosis*; *blastomycosis*, which is the most serious and refractory, *hemisporosis*, etc. The skin manifestations resulting from these infections are extremely varied:

Subcutaneous: Subcutaneous gummy swellings, ulcerative "gummas," lymphangitis with acute or cold adenitis, superficial or deep abscesses.

Dermal: Vegetative and verrucose lesions, or lesions simulating lupus, acne or epithelioma.

Epidermal: Simulating pityriasis, eczema or herpes.

An actual causal treatment for the mycoses is available. Potassium iodide is prescribed in ascending doses so as to reach 4 grams (1 dram) a day in a few days; at this dosage the iodide becomes active. The daily amount may be increased to 5 or 6 grams (75 to 90 grains).

Gougerot applies this treatment as follows: A 20 per cent. solution is used [potassium iodide, 100 grams ($3\frac{1}{3}$ ounces); distilled water, to make 500 cubic centimeters (17 fluidounces)]. In the average cases the daily dose is placed at 4 to 6 grams (60 to 90 grains), taken in a glass of sweetened water flavored with tincture of bitter orange

peel, which the patient drinks in divided amounts in the course of the day.

To obviate intolerance, the patient uses a water containing sodium bicarbonate; intermissions of twenty-four to forty-eight hours every eight or ten days may be allowed. The treatment should always be kept up for several months after apparent recovery. In all instances, before subjecting the patient to this treatment it is necessary to make sure that he is suffering neither from tuberculosis nor cancer.

The *local treatment* is merely an adjunct.

For dressings, very dilute iodine-iodide solutions (a few drops of the original solution in 50 cubic centimeters— $1\frac{2}{3}$ fluidounces—of water) should be used; or, a powder or plaster of iodide of iron.

Large abscesses should be punctured; ulcers and osteitis call for the usual surgical measures.

Finally, a watch must be kept on involvements of the mucous membranes, which make the prognosis worse and constitute an obstacle in the way of the general iodide treatment. In cases with intolerance, the iodide may be prescribed in keratin-coated capsules or given in an enema, with or without addition of laudanum. Other iodine preparations may also be resorted to, *e.g.*, lipiodol, 5 to 10 cubic centimeters (80 to 160 minims) by intramuscular injection, or iodide of iron, 1.5 grams ($22\frac{1}{2}$ grains) a day. In obstinate cases, all the therapeutic resources should be used in combination, the local treatment pushed, and general tonic treatment, heliotherapy and the X-rays added.

B. Superficial Mycoses or Tineas.—These include a large number of different varieties. A botanic classification might be offered, but from the standpoint of treatment it is better to group these varieties according to their regional or topographic distribution. The therapeutic procedures, indeed, are the same for all the different species of parasites; they have but one object, *vis.*, destruction of the latter, but they differ in their modalities according to part affected. The tineas are all *transmissible* affections, and those involving the scalp are the most easily transmitted of all.

Tineas of the Scalp (*tinea tonsurans*, *large-spored* or *small-spored*; *tinea favosa*).—*Tinea tonsurans* (ringworm of the scalp) is met with most commonly in childhood. The prophylactic treatment consists in isolating the patient and covering his head with a suitable cap. His associates should be examined at short, regular intervals, and any suspicious area should be investigated by repeated microscopic examinations of scales and painted with 1 per cent. tincture of iodine.

The curative treatment includes the preparatory step of cutting the hair short and cleansing the scalp by washing with soap and by local appli-

cations. All parts of the scalp invaded by the fungus may then be exposed to the depilatory action of the X-rays. This measure should be carried out only by a practitioner thoroughly familiar with the technic. The hair falls out *in toto*, the subject thereupon ceases to be infective, and regrowth begins to occur after two or three months. Formerly, by simple epilation with forceps, it took two or three years to cure a ringworm patient.

In all instances it is advisable to support the child's general condition; he is always more or less of the lymphatic type. After recovery the physician should keep on the watch for a recurrence.

Tineas of the Bearded Region (*tinea sycosis*, *Leloir's agminate folliculitis*, *microscopic tinea*, *nodular and kerion sycosis*).—The field is first cleared by cutting off the hairs with scissors, the lesion cleansed with Alibour's fluid diluted 1:5, and each hair with a suppurating follicle then plucked out with forceps. The closed follicles are opened with the scarifier, and it is deemed advisable to protect the neighboring parts by making a ring of depilation a few millimeters wide around the diseased area. X-ray treatment, while less indispensable in these cases, is employed with the same degree of success.

Tineas of the Glabrous Skin (*tinea circinata*, *tinea favosa*, *tinea versicolor*).—The preparatory treatment consists in cleansing and clearing the skin by washing with soap. Various iodine preparations are then used as applications or rubs: Iodine in alcoholic solution (2 per cent. tincture of iodine or a 1:9 mixture of 10 per cent. tincture of iodine with compound spirit of ether); or iodine in aqueous or glycerin solution, a 3 per cent. iodine-iodide solution, or an iodine ointment:

℞ Iodi	1 gram	(gr. xv);
Xylolis	12 c.c.	(f3iij);
Petrolati	100-300 grams	(℥iiss-x).
Ft. unguentum.		(BORV).

Other kinds of ointments are also used, *e.g.*, 1 per cent. chrysarobin ointment, 0.5 per cent. calomel ointment, and Alibour's ointment.

Tineas of the Palms and Soles.—The epidermis, being very thick in these areas, requires careful preliminary treatment with pumice, the curet, 1 per cent. iodine in glycerin, or a 2 to 10 per cent. salicylic acid paste. The active treatment is that already described.

Epidermitides of the Natural Folds [*erythrasma*, *inguinal epidermophytia* or *epidermophytia of the interdigital spaces (toes)*].—Every evening the skin should be washed with soap and water, and 2 per cent. tincture of iodine vigorously rubbed on. Next, iodine in petrolatum, calomel ointment or Alibour's ointment should be ap-

plied, and the region then dusted with talcum powder. This treatment should be continued after recovery, as recurrence is common.

Onychomycoses (*trichophytina* or *favosa*).—These are obstinate disorders, requiring active treatment. If the X-ray is unavailable, one should endeavor to soften the lesion with wet dressings of iodine-iodide solution and then apply either an iodine ointment, a salicylic acid plaster, or mercurial collodion (bichloride, 0.33 gram—5 grains;—flexible collodion, 12 cubic centimeters—3 fluidrams).

ARTIFICIAL FORMS OF DERMATITIS.

This group comprises all the skin conditions caused by an irritating action of mechanical, physical or chemical origin. These conditions constitute one of the most complex divisions of dermatology. Polymorphism on the part of the lesions is characteristic: All types of eruptions and all varieties of skin lesions may be met with, and in any degree of intensity. The onset may be immediate or delayed and the course slow or rapid; these features vary according to the cause, and the latter may be obvious or concealed, accidental or purposeful, and in some cases even simulated. They also vary according to the "soil," the sensitiveness of the subject, and the region involved. There is no constant relationship between the causes and the effects: The same agency may induce different kinds of skin disturbances; a given skin disturbance may be due to different causes. Above all, these conditions are extremely common, and whatever difficulty be experienced in ascertaining the cause, when confronted with a skin lesion the practitioner should always bear in mind the possibility of an artificial dermatitis.

A review of the most important and frequent of these conditions will now be given, the classification being borrowed from Darier.

I. Dermatitis Due to Mechanical Causes.—*Traumatic eczema, excoriations due to scratching* (see *Eczema*), *lichenification* (see *Psoriasis*), *traumatic alopecia* (see *Seborrhea*), *lesions due to pressure or friction* (erythema, blisters, ulceration, gangrene, bullæ, spontaneous or traumatic callosities, corns).

Corns.—In the treatment of a corn, care should be taken to eliminate the cause, which is always a narrow or ill-formed shoe. Periodically, and after a protracted bath, the superficial layer may be removed either with the knife or pumice-stone, and the lesion protected from further pressure by a corn plaster: This is, however, merely palliative treatment.

To make the corn disappear, it must first be softened, then excised.

It may be softened with various preparations; *e.g.*, it may be painted with tincture of thuja [*Thuja*, N. F.] or with *salicylic collodion* [*Collodium salicylicum compositum*, N. F., with fluidextract of cannabis].

R. Acidi salicylici	1	gram (gr. xv);
Extracti cannabis	0.5-1	gram (gr. viiss-xv);
Alcoholis	1.2	c.c. (m xx);
Ætheris	3.5	c.c. (m lvj);
Collodii flexilis	6.2	c.c. (m c).
		(VIGIER.)

A film of this preparation is applied nightly for a week; then, after a prolonged hot foot-bath, the collodion and callosity are removed with the aid of a blunt needle. Recurrence frequently occurs.

II. Dermatitis Due to Physical Causes.—Frost-Bite.—A frost-bite should first be treated by a slow, gradual warming of the part. Then, the same applications should be made as for burns and pyogenic dermatitis (*q.v.*).

Chilblains (*erythema pernio*).—Jacquet's biokinetic method prevents the appearance of chilblains by causing the children to execute several times daily for a few minutes vigorous movements at the distal joints of the extremities, the latter being kept well elevated. To this a few hygienic precautions should be added: Standing up in the cold and dampness is to be avoided; as is also a sudden warming of the extremities near a fire; the parts should be dry-rubbed or rubbed with alcohol.

The general condition should be improved and the scrofulolympathic diathesis combatted with the various tonics commonly used in childhood (codliver oil, arsenic, iodine preparations). The local treatment will have to meet various indications. A stay in bed and hot astringent baths (*e.g.*, of walnut leaves—*Juglans regia*) are sufficient to cure extensive, but not yet ulcerated lesions of the feet or hands, in a few days. For the pain and itching, lime liniment with addition of a little laudanum may be used, or the parts painted with glycerite of tannic acid and dusted with a bland powder. Local baths of fifteen or twenty minutes' duration in hydrogen peroxide solution diluted with two-thirds its volume of water, carried out two or three times a day, are recommended by Darier.

In the ulcerated forms, the first step is to cleanse the lesion, and this is followed by the use of lime liniment, the various keratoplastic agents (ichthyol, resorcinol), and also hot air and the galvanic current.

Chaps and Fissures.—In the case of the *hands* and *forearms*, a lotion consisting of 1 part of coal tar and 4 parts of tincture of quillaja

and inunctions three times daily with glycerite of tannic acid constitute the treatment.

For the *lips*, *nose* or *anus*, use may be made of compound tincture of benzoin, glycerin with addition of balsam of Peru, cold cream, or a mixture in equal parts of oil of sweet almonds and cacao butter.

Where the *breast* is affected, it should be washed with alcohol after each feeding; the base of the fissure should be treated with a drop of tincture of iodine and pure balsam of Peru then applied. The breast should be protected with a sterile compress and a watch kept over the cleanliness of the mouth of the child, direct contact of which with the breast should be avoided.

Burns.—A burn is a wound requiring cautious management. It should first be cleansed with soap and water, all foreign bodies being removed, blisters emptied (sparing, however, the loosened epidermis) and the margins of the lesions disinfected with diluted tincture of iodine. Some do not hesitate to carry out this time-consuming process, which must be carefully done, under general anesthesia. There is a tendency to abandon the use of picric acid.

A satisfactory dressing for a burn must be light and composed of a slightly antiseptic substance allaying pain and keeping the dressing moist so that it will never adhere to the raw surface. Lime liniment (carron oil) is an old-time preparation which retains all of its original value. Certain aromatic oils based on melilot are strongly analgesic.

Alglave recommends a solution of gomenol in oil, covered directly with fabric. The *paraffin mixtures* seem, however, to have given the best results so far, *e.g.*, Barthe de Sandfort's ambrine or combinations of the type of the following one, formulated by Gougerot:

R Sodii naphtholatis	2 grams (3ss);
Olei thymi,	
Olei origani,	
Olei geranii	3 c.c. (℥℥);
Petrolati puri	1000 grams (3xxxij);
Paraffini (melting at 45° C.)	5000 grams (℥clx).—M.

The mixture, fused on a water bath at 50° C., is applied with a camel's hair brush before it has had time to cool; it is now covered with a very thin layer of sterile absorbent cotton and another layer of the preparation applied; this is allowed to dry and a dressing of non-absorbent cotton is applied over it. The paraffin and its cotton framework form a shell over the burn, from which it remains separated by copious oozing of serum, which is washed off at the time of the next dressing by irrigation with boiled water or physiologic salt solution. Granulation takes place rapidly and often very abund-

antly. The patient does not suffer from pain. The redressing is done daily at first, then at increasing intervals as the inflammatory manifestations subside.

• **Actinic Erythema** (*sunburn, electric erythema*).—The wearing of a colored veil or the application of creams and powders based on quinine afford protection from this condition. Darier recommends the following formulas:

Ointment.

℞ Quininae hydrobromidi	1 gram	(gr. xv);
Aquæ destillatæ	15 c.c.	(f ³ ss);
Adipis lanæ anhydrosi	5 grams	(gr. lxxv);
Petrolati	10 grams	(ʒiiss).—M.

Powder.

℞ Quininae sulphatis	1 gram	(gr. xv);
Talci purificati	15 grams	(ʒss).—M.

Lime liniment, tepid baths and zinc oxide ointment suffice in the treatment of sunburn.

X-ray Dermatitis.—Occupational or therapeutic X-ray dermatitis is attended with varied and often very serious lesions. In the case of the operator, the use of gloves, an apron and spectacles should be availed of invariably. As for the patient, extreme caution should be exercised in carrying out the treatment. The dose and quality of the rays used, the time of exposure and the distance of the apparatus from the patients must all be exactly predetermined.

Untoward happenings should, theoretically, be preventable. When they do occur, there should be applied to the different varieties of X-ray dermatitis the usual treatments for erythema, alopecia, pigmentation, blisters, ulcers, local necroses, or scleroderma, the attendant bearing in mind, however, that the mode of production cannot but render them more refractory to active treatment and expose the patient to late recurrences.

III. Dermatitis Due to Chemical Causes. Toxic Dermatitis.—There are innumerable varieties of this condition.

The treatment should always be directed toward the same objects: To remove the cause, rid the skin surface of the particles of irritating substance it may still contain (washing with soap, inunctions), allay local inflammation, if present, and treat the lesion according to the type of eruption it exhibits. More than in any other affection, the general condition of the individual should be the object of treatment, based both on examination of the functions and organs and on the obscure factors afforded by certain problems of

general clinical medicine that have not yet been solved (morbid predispositions and idiosyncratic intolerance, habituation and accumulation, anaphylaxis).

A. Toxic dermatitis of external or direct causation, through the application of some noxious substance to the skin.

In this class are the *feigned* eruptions (dermatitis factitia) or *induced* dermatitis, due to some toxic material of animal or vegetable origin, the important group of *occupational* dermatitis, and the still larger group of *external drug eruptions*.

Among the last-named, a word should be said concerning the cases of dermatitis due to *dyes*. When an eruption has been caused by recently dyed cloth, the source of the disturbance may remain obscure. In the case of a dye used for the hair or beard, the patient is not always willing to divulge the fact. The constituents of such dyes, *viz.*, silver nitrate, lead subacetate and pyrogallol, are less toxic, however, than paraphenylenediamin, which frequently gives rise to an acute erysipelatos eczema, the treatment of which should be the same as that of ordinary eczema.

B. Toxic dermatitis of internal or indirect causation, through the ingestion or absorption of some noxious product.

In dermatitis *medicamentosa* (mercury, antipyrin, balsamics, arsenic, bromine, iodine, etc.), the drug incriminated should be withdrawn; this is, however, not always sufficient to check the persistent course of the eruption. It is well in such cases not to rely too much on the asserted merits of certain corrective combinations (antidotes).

In eruptions of *alimentary* origin (preserved meats, game, shellfish, mushrooms), the digestive canal should be emptied by active measures for the purpose; thereafter, no food should be given for a time and a strict diet then imposed.

In the *autotoxic* eruptions (gout, uremia, diabetes), the general condition and the causative disease should be treated in a more active way and periods of general detoxication (blood withdrawal, fasting, purgation and diuretics), instituted.

A *serum erythema* is caused by the serum *per se* and not by the anti-toxins it contains; it rarely follows the first injection of serum.

Serum manifestations are dependent upon the anaphylactic process. When the first injection of any serum is being made, the patient should be asked whether he has not at some previous time, even several years before, received an injection of the same or a different serum; this inquiry is sometimes all the more necessary in that during the world war, antitetanic serum was regularly administered to the wounded.

In treating a patient with serum, one must avoid allowing an interval of ten to fifteen days to elapse between two injections; accordingly, it is better to give large doses from the start and administer injections at short intervals, even at the risk of giving too many, until it is certain that they will not have to be resorted to again.

The unpleasantness of serum manifestations may thus be obviated to the largest possible degree.

When necessary, however, one should not allow himself to be deterred from giving another injection. Anaphylactic symptoms have created an undue amount of alarm in the minds of many practitioners, and this has certainly detracted somewhat from the effective utilization of serum therapy. Serum manifestations may, indeed, be prevented by the use of the procedure recommended by Besredka, which consists in injecting subcutaneously at hourly intervals, first 1 cubic centimeter of serum, then 2 cubic centimeters, and finally the whole dose ordered.

Calcium chloride, 3 to 5 grams (45 to 75 grains) a day, has a preventive and curative effect.

PYOGENIC DERMATITIS.

Pyogenic dermatitis comprises a group of protean skin disturbances. These are due to inoculation by the external, epidermal route of the common pyogenic germs—staphylococci, streptococci, gonococci, *B. pyocyaneus*, and various other micrococci, such as the bacillus of seborrhea, *B. cutis communis*, *B. subtilis*, etc.—all common saprophytes of the integument.

This nosologic class has been getting steadily larger in recent years; an increasing number of skin conditions, often quite unrelated, are being proven to be due to a previously unsuspected microbic agency. The investigations of Sabouraud and, during the world war, those of Gougerot, imparted to this question so high a degree of clinical and therapeutic importance that it is not permissible to be unfamiliar with them, since overlooking such disorders may lead to mistakes in prognosis and treatment highly prejudicial to the interests of the patients.

The **local treatment** of a pyogenic dermatitis aims to allay the inflammatory element and combat infection. Free use of the antiphlogistics, cautious use of the antiseptics—such is the best clinical rule. It is well, indeed, to beware of the irritant action of the antiseptics, whether with the object of avoiding a secondary eczematization of therapeutic origin, or whether the condition present is a pyogenic dermatitis complicating eczema

(e.g., eczema impetiginosum), in which it is necessary to defer to the eczematous component and treat it on its own account. (See *Eczema*.)

First of all, one should set about the detection—to be followed by the elimination—of all local factors favoring the development of a pyogenic dermatitis by enhancing the virulence of the saprophytic germs, *viz.*, occupational sources of irritation (in washerwomen, cooks, dyers), accidental irritations (soaps, alkalies, maceration by the sweat) and especially prurigo (parasitic prurigo), in which the scratching favors and multiplies the inoculations.

Similarly, it is necessary to treat, along with the pyogenic dermatitis, all factors that are tending to keep it up and bring about numerous recurrences, such as herpes, post-auricular eczema, chronic coryza, blepharitis, etc., which constitute as many niduses of infection and the starting-points of fresh invasions.

The virulence of the germs is not the sole factor in pyogenic dermatitis. The resistance offered by the body at large to the infection is also to be given due consideration, and the practitioner should endeavor by appropriate *general treatment* to correct the pathologic conditions that are increasing the receptivity of the patient. Athrepsia in the infant, lymphatic tendencies in the child, debility in convalescents (furunculosis) and diabetes mellitus are among the conditions that should be vigorously treated. Furthermore, certain preparations, such as fresh brewer's yeast, pure or in a glycerin extract, colloidal sulphur or sulphur and honey, the salts of tin, extract of lappa [burdock root, *Lappa*, N. F.] and the vaccines afford the practitioner resources for medication calculated to combat infection.

For prophylactic purposes, and to obviate propagation of the disorder, the patient should be forbidden to scratch himself (auto-inoculations), and in relation to his associates the required measures for a sufficient degree of isolation should be taken, the different forms of pyogenic dermatitis being transmissible and even becoming disseminated, among children, in the form of epidemics in families or schools.

I. Impetigo.—At the beginning, for the first two or three days, the inflammatory manifestations should be treated by means of sprays, starch or starch-flour poultices applied cold, or moist dressings; the latter should not be left on continuously, since on account of maceration of the epidermis the virulence of the bacteria might become enhanced and the lesion spread by auto-inoculation. The irritated surface must also be cleansed; the dressings and poultices will loosen the crusts; the bullæ should be punctured with a needle sterilized in a flame and the dead epidermis excised.

This first step having been gone through, the exposed lesions are treated three or four times a day with a pledget of cotton dipped in Alibour's fluid, pure or diluted one-half. Some employ with success 10 per cent. silver nitrate, 1 per cent. methylene blue, or Ziehl's carbol-fuchsin. The different varieties of boric, camphorated, calomel and yellow oxide ointments are then used, and especially the combination recommended by De Hérain; which yields excellent results.

ALIBOUR'S PASTE.

℞ Zinci sulphatis,			
Cupri sulphatis	āā	0.05-0.5 gram	(gr. $\frac{3}{4}$ -viiss);
Sulphuris præcipitati loti	1, 2.5 vel 5	grams	(gr. xv-xxxviiss-lxxv);
Talci purificati,			
Zinci oxidi	āā	30 grams	(3j);
Olei amygdalæ dulcis	40	c.c.	(f3x).—M.

ALIBOUR'S CREAM.

℞ Zinci sulphatis,			
Cupri sulphatis	āā	0.05-0.5 gram	(gr. $\frac{3}{4}$ -viiss);
Sulphuris præcipitati loti	1, 2.5 vel 5	grams	(gr. xv-xxxviiss-lxxv);
Magnesii carbonatis,			
Adipis lanæ anhydrosi	āā	12 grams	(3iij);
Olei (olivæ)	12	c.c.	(f3iij);
Aquæ	60	c.c.	(f3ij).—M.

The most reliable procedure is to use the strongest formula from the start and then graduate the strength of the application by the "two-jar method."

Disks of red plaster [red mercuric oxide, 3 parts; red oxide of lead, 5; diachylon plaster, 52] or zinc oxide plaster may be used during the final healing process.

II. True Ecthyma, Pustular and Ulcerative.—This disorder, which is seen mainly on the lower extremities, demands complete rest in bed.

The bullæ should be opened with scissors and a tampon of pure Alibour's fluid used, or very hot and prolonged bathing in the same solution, diluted one-half, prescribed, after which there should be applied Alibour's ointment or healing powders such as bismuth subgallate, thymol iodide or *Alibour's powder*: Copper sulphate, 0.05 gram ($\frac{3}{4}$ grain); zinc sulphate, 0.1 to 1 gram ($1\frac{1}{2}$ to 15 grains), and talc, 100 grams ($3\frac{1}{2}$ ounces).

If the ulcer is covered with a thick pseudo-membrane, it should first be cauterized with zinc chloride, silver nitrate or a metallic zinc stick. Iron subcarbonate in powder form or in a 20 per cent. ointment is an old-time preparation which is very effective.

III. Papular Impetigo of Infants (*post-erosive syphiloid of Sevestre and Jacquet*).—This is a disorder of nurslings which must be differentiated from the lesions of congenital syphilis.

The treatment is that of impetigo, carried out with weak preparations. The diaper should be changed as often as is required to avoid maceration; powders should be applied at short intervals or the parts completely covered with sterile bran, which, by virtue of its absorbent power, checks the irritation maintained by the urine and feces.

IV. Perlèche.—A transmissible disease of childhood. Children with this condition should not kiss healthy persons; the glasses and other table-ware used by them should be sterilized with boiling water. A simple application of silver nitrate and a little yellow oxide ointment are sufficient to cure it.

V. Furfuraceous Scaliness (*or dry impetigo of the face, or pityriasis simplex of the face*).—This condition is met with in persons with delicate skins; cold, wind and sea air tend to keep it up. Washing of the face with sodium borate solution, warm Vichy water or tar soap should be advised. Over night, applications of starch glycerite with 3 per cent. of sodium borate, or of 5 per cent. calomel ointment, are recommended. If the condition is refractory, it should be treated with 1 per cent. resorcinol or salicylic acid solution.

VI. Intertrigo (*affecting any of the cutaneous folds or the post-auricular sulcus*).—The disorder may be either dry or oozing. The area should be cleansed with Alibour's fluid diluted one-half and the moist surfaces cauterized once with 10 per cent. silver nitrate or painted daily with a 1 per cent. tincture of iodine. Thereafter, Alibour's paste should be applied and the surfaces in contact kept separated with a pad.

VII. Microbic Dermo-Epidermitis.—This term designates certain skin infections of very variable clinical aspect of which Gougerot made a study in war wounds. Their polymorphism is such that they are capable of reproducing not only the usual lesions of pyogenic dermatitis, *viz.*, impetigo and ecthyma, but also a whole series of eruptive types—erosive with or without oozing, scaly, pityriasic, asbestos-like, psoriasiform, xero-dermatous, verrucose—which one would be tempted to refer to eczema, psoriasis, parakeratosis, lichen, artificial dermatitis and dermatitis medicamentosa.

The treatment of these many varieties should always be based on the same principles, in accordance with the nature of the lesion. Mild procedures should be resorted to first, then vigorous procedures, and the strength of the reducing agents applied should be regulated with some caution.

Silver nitrate in 2 to 10 per cent. solution is the remedy of choice, according to Gougerot; it acts as an antiseptic, caustic, healing agent and antipruritic.

VIII. **Folliculitis.**—This form of infection may either be superficial and readily curable, though subject to recurrences—*Bockhardt's staphylococcic impetigo*—or may appear as a deep-seated painful disturbance advancing by successive exacerbations and discouragingly obstinate—*sycosis*.

To cure folliculitis of the extremities and trunk, all that is necessary is to open the pustules and cauterize them with tincture of iodine, use a spray over them a few times if the lesions are many and confluent, and make applications of Alibour's fluid. A dry dressing is then applied, consisting either of disks of red plaster (see above: *Impetigo*) or of Alibour's powder.

Folliculitis of the beard and mustache is, on the other hand, a laborious condition to treat.

After having excluded trichophytosis by microscopic examination of the affected hairs, cleansing of the diseased area is proceeded with: The use of the razor is interdicted, the hairs in the affected area cut short, the crusts loosened with wet dressings and sprays, and the pustules opened each day with the scarifier, emptied, and treated with tincture of iodine or Alibour's fluid. As long as the pain and inflammation continue, the treatment should be limited to frequent spraying and starch-flour poultices. Then ointments are used, prepared according to the formulas already alluded to for the preceding conditions, and likewise red plaster or mercurial plaster. Depilation assists recovery, and is carried out either with forceps—a tedious and often painful procedure—or with the X-rays, by a somewhat difficult technic.

In sluggish cases, vaccines (see separate heading further on) may be resorted to. It should be added that sycosis of the upper lip is generally caused and perpetuated by coryza, which should be energetically treated.

IX. **Furuncle. Carbuncle. Hidrosadenitis.**—In the early stage, *abortive* treatment may be tried, either with a dressing of alcohol or spirit of camphor or by painting the lesion two or three times at intervals of a few hours with tincture of iodine or one of the following combinations: (1) Iodine, 2; acetone, 5. (2) Tincture of iodine, arnica, and spirit of camphor, equal parts.

When the furuncles are in process of development or ready to open, reinoculations of neighboring areas should, above all, be obviated. The region should be washed with water and an antiseptic soap,

a mixture of alcohol and ether with 0.1 per cent. of iodine applied over it with a cotton pledget, and maturation hastened either by prolonged sprayings with the Lucas-Championnière apparatus or by the application over each lesion of a small sheet of cotton impregnated with starch glycerite containing 10 per cent. of sodium borate or 1 per cent. of salicylic acid, held in place by adhesive strips. It is never necessary to incise a boil; at the most, when it has matured, may one make an opening in the thinned epidermis which is still keeping it closed. In the last stage of the lesion, its opening should be covered with a disk of red plaster (for formula, see above: *Impetigo*).

A *carbuncle* of small size is treated like a furuncle. If the carbuncle is an extensive one or presents an angry appearance, the surgeon should be called in.

Hidrosadenitis, or inflammation of the sweat-glands, is treated locally like furuncles, and the hair in the axilla should be spared. In the cases running an apparently interminable course, general treatment should by all means be instituted to assist in recovery, and a few local applications of plain or diluted mercurial ointment may yield surprising results.

Vaccine Treatment.—This procedure may be added to the local and general treatment of furunculosis, carbuncle, acne and a few other forms of recurring and obstinate pyogenic dermatitis (e.g., sycosis).

There are two kinds of vaccines: The polyvalent vaccines known as *stock vaccines*, and the vaccines made from cultures of organisms obtained from the lesions of the patient himself, or *autogenous vaccines*.

The latter variety is generally the more active and can be prepared without difficulty in many laboratories. The vaccine is delivered in 1 to 2 cubic centimeter ampoules.

Besides these vaccines prepared by various procedures in watery solution, there are the *lipovaccines*, in which the bacterium is supplied in an oily solution. On account of their slow diffusion, or for some other reason, these lipovaccines appear to act very effectively and often more lastingly.

Vaccine injections are given on alternate days, beginning with one-third of a dose, and attaining the full dose after a few injections. In general, 12 to 15 subcutaneous injections are required, and if recovery does not seem complete, another series of injections should be started after an interval of one month.

Hemotherapy.—This consists of withdrawing blood from the patient by vein puncture and reinjecting it deeply into the muscles of the thigh. Reactions such as lumbar pain, joint pains and febrile

movements are rare. The patient's sensitiveness must be tested out and 10 to 15 injections of 10 cubic centimeters given.

Hemotherapy gives excellent results in furunculosis, hidrosadenitis of the axilla, and even in breast abscess. In the first two affections mentioned, it has proven superior to vaccine therapy in a large number of cases.

BULLOUS SKIN DISORDERS.

HERPES SIMPLEX.—HERPES ZOSTER.—PEMPHIGUS.

I. Herpes Simplex.—The initial general manifestations may be combated with the antipyretics. Locally, a bland powder is sufficient in the treatment of ordinary herpes. On the other hand, *herpes genitalis*, often inflamed and painful, with glandular swellings due to secondary infection, requires rest in bed. These inflammatory manifestations call for wet dressings, local baths and poultices; as a rule, however, wet dressings and ointments are poorly borne.

The treatment of an ordinary case consists in washing the lesion and using a dusting powder. Various lotions are used: Boiled water, 1 per cent. lead subacetate solution, 0.5 per cent. zinc sulphate solution or an infusion of walnut leaves (*Juglans regia*). The following combination is then used as a dusting powder:

℞ Acidi tannici	0.2 gram (gr. iij);
Zinci oxidi	2 grams (5ss);
Talci purificati	8 grams (3ij).—M.

and the lesion covered with a layer of fine fabric. In more pronounced cases, weak pastes of zinc oxide or calomel (1 per cent.) may be resorted to.

In the ulcerated forms, 5 per cent. silver nitrate solution should be applied and the condition treated like a pyogenic dermatitis. In recurring cases, causes of general irritation (dietary indiscretions, emotions) or of local irritation (uncleanliness, sexual excesses, leukorrhea, phimosis) should be corrected. X-ray treatment has sometimes proven successful.

Abortive treatment by means of frequently renewed wet dressings of alcohol or 2 per cent. resorcinol, 1 per cent. phenol or 2 per cent. tannic acid in alcohol fails in the majority of instances.

II. Herpes Zoster.—The general treatment of herpes zoster is directed toward relief of pain; any of the analgesics may be used.

The local treatment should not be very active: The vesicles may be opened with a sterile needle, dusted with some bland powder, and

the affected area protected with a compress. In cases with complicating ulcerations, dressings of lime liniment may be applied. In the subsequent neuralgic pains X-ray treatment has given excellent results.

III. Pemphigus.—*Acute*: Acute febrile form, pemphigus neonatorum, the recurring form (Brocq's polymorphic dermatitis, Duhring's dermatitis herpetiformis), herpes gestationis and hydroa vacciniforme. *Chronic*: True pemphigus, pemphigus foliaceus, congenital pemphigus.

The treatment of the acute forms should be directed, in the first place, to the general condition; fever and adynamia should be combated with collargol and injections of physiologic salt solution. Arsenic, arsphenamin, adrenalin, quinine and ergotin have been recommended. Locally, antipruritic preparations should be used and wet dressings avoided, employing chiefly lime liniment or creams, such as cold cream, in which reducing agents have been incorporated in small amounts.

IV. Urticaria. Prurigo. Lichen. Lichenification.—See Part III: *Itching*.

SEBORRHEA.—ACNE.

Seborrhea is a constitutional state which finds its expression principally on the face and scalp. Acne is a form of pilo-sebaceous infection superimposed upon a seborrheic "soil." These two conditions are closely related. The factor of the diathetic "soil" and the no less important factor of microbic infection are the two features at which the treatment is mainly directed.

General Treatment.—This is concerned with the visceral disturbances which accompany the seborrheic state. These disturbances should be corrected by careful attention to the general hygiene of the body: Exercise, gymnastics, open air life, hydrotherapy and rubs; elimination of overstrain and fatigue, and a strict dietary régime to which it is well to add digestive measures (Bourget's solution) and laxatives (rhubarb, aloe).

Glandular insufficiencies, *e.g.*, of the thyroid or ovaries, should be made good by organotherapy. For anemia, iron, arsenic, iodine and codliver oil are recommended. For the diathetic state, sulphur may be given internally (sulphur and honey, colloidal sulphur, calcium sulphide) and treatment at sulphur mineral springs advised. Lastly, for the acne and the associated bacterial infection, tin, fresh brewer's yeast and vaccines (see *Furuncle*) may be employed; niduses of infection in the nose, sinuses or pharynx should also be destroyed.

Local Treatment.—Seborrhea of the Glabrous Regions.—The skin should be washed, defatted and treated with sulphur.

Washed: Local bathing; hot, aqueous, soapy (borated or resorcinolated soap) or alcoholic lotions.

Defatted: Rubs with a cotton pledget dipped in spirit of ether; vigorous massage followed by a séance of facial gymnastics; expression of comedones by hand with a watch-key or comedone extractor.

Treated with Sulphur: According to the sensitiveness of the skin, the following measures, in the order of increasing activity, should be prescribed: Spraying with a sulphur mineral water; rice powder containing 1 to 5 per cent. of sulphur; lotions, to be spread quickly over the area and allowed to dry:

Lotions:

℞ Sulphuris præcipitati loti	1-3 grams (gr. xv-xlv);
Talci purificati	2-6 grams (3ss-iss);
Glycerini	12 c.c. (f3iij);
Aquæ rosæ	60 c.c. (f3ij);
Tincturæ quillajæ	5 c.c. (℥lxxx).

Tere bene simul.

(GAUCHER.)

Sig.: Shake vigorously.

℞ Sulphuris præcipitati loti	1-5 grams (gr. xv-lxxv);
Spiritus limonis	10 c.c. (f3iiss);
Aquæ destillatæ	50 c.c. (f3xiiij);
Sodii chloridi, Resorcinolis	ââ 0.5 gram (gr. viiss).

M. Sig.: Shake vigorously.

(SABOURAUD.)

Powder:

℞ Amyli, Magnesii carbonatis	ââ 20 grams (3v);
Iridis pulveris (N. F.)	10 grams (3iiss);
Sodii boratis	1-2.5 grams (gr. xv-xxxviiss);
Sulphuris præcipitati loti	0.5-10 grams (gr. viiss-3iiss);
Acidi salicylici	0.5-1 gram (gr. viiss-xv).

(GOUGEROT.)

Seborrhea Capitis and Seborrheic Alopecia.—The treatment has for its purpose to cleanse the scalp, combat the seborrhea with sulphur preparations, and favor the regrowth of hair by the application of stimulating lotions.

1. *Defatting of the Scalp.*—Lotions of warm water with addition of 2 per cent. of sodium carbonate, or a decoction of quillaja, 100 grams (3½ ounces) of the bark to 1 liter (quart) of water, are employed. Use may also be made of a 5 to 10 per cent. oily mixture of oil of cade, a 2 per cent. sodium borate lotion, or cade, tar or cedar oil soaps.

Some of these preparations dry the hair and make it brittle. This difficulty is overcome by the use of a hair oil containing castor oil or liquid petrolatum.

2. *Sulphur Applications*.—Whatever preparation be used, it is always applied to the scalp at night with the same procedure, which consists in parting the hair in a series of different places and treating these linear areas separately. The procedure in a nutshell is: "Twenty parts, twenty minutes."

The sulphur preparations are very many, and, according to the case, the results obtained and the sensitiveness of the scalp, there may be employed:

Sulphide lotions, mild in action but with a nauseous odor: Twenty to sixty drops of liquid potassium polysulphide (*i.e.*, dissolved in twice its weight of water) and 5 cubic centimeters (80 minims) of tincture of benzoin in 100 cubic centimeters ($3\frac{1}{2}$ fluidounces) of hot water. In using sulphide lotions the eyes should be protected, and the area dried with a hot towel.

Sulphur lotions, more irritating but more effectual, leaving a sulphur powder on the scalp:

℞ Sulphuris præcipitati loti	4-20 grams (3i-v);
Glycerini	16-48 c.c. (f3ss-iss);
Aquæ rosæ	120 c.c. (f3iv);
Tincturæ quillajæ	10 c.c. (f3iiss).
M. sec. art.	(GAUCHER.)

℞ Sulphuris præcipitati loti	5-10 grams (gr. lxxv-cl);
Olei cadini	10-20 c.c. (f3iiss-v);
Ætheris	70 c.c. (f3xix);
Alcoholis	62 c.c. (f3xvij);
Pyrogallolis	0.5-2 gram (gr. viiiss-xxx).—M
	(SABOURAUD.)

Sulphur ointments, in obstinate cases, where the skin is irritable, or where the hair becomes dry and brittle:

℞ Sulphuris præcipitati loti	2-6 grams (3ss-iss);
Olei theobromatis	10 grams (3iiss);
Olei ricini	50 c.c. (f3iiss);
Balsami Peruviani	1 c.c. (m xv).—M.
	(GOUGEROT.)

Gougerot recommends that this formula be varied by the incorporation in it of other products acting as fat solvents or stimulants to the scalp, such as oil of cade, tar, resorcinol, salicylic acid, beta-naphthol, camphor, etc.

Sulphur powders are reserved for severe cases. They are applied with a powder-blower.

A cap is donned to avoid dispersion of the powder over the face and neck, and in the morning the powder is removed with spirit of ether.

℞ Acidi salicylici	0.5-2 grams (gr. viiss-xxx);
Pilocarpinae hydrochloridi	0.5-1 gram (gr. viiss-xv);
Sulphuris præcipitati loti, Sodii boratis	5-10 grams (gr. lxxv-cl);
Magnesii carbonatis	10 grams (3iiss);
Talci purificati	80-60 grams (3iiss-ij).—M. (BROCQ.)
℞ Lycopodii, Iridis pulveris (N. F.), Zinci oxidi pulveris, Talci purificati, Sulphuris præcipitati loti	10 grams (3iiss). (SABOURAUD.)

3. *Stimulating Lotions*.—These are used to hasten the regrowth of the hair and are applied in the morning by the “part” procedure with a soft brush.

The stimulating lotion used at the Hôpital Saint-Louis consists of: Oil of turpentine, 17.5 cubic centimeters ($4\frac{3}{4}$ fluidrams); stronger ammonia water, 5 cubic centimeters (80 minims); spirit of camphor, 100 cubic centimeters ($3\frac{1}{3}$ fluidounces).

The following preparations may also be used:

℞ Betanaphtholis	0.1 gram (gr. iss);
Hydrargyri chloridi corrosivi	0.2 gram (gr. ij);
Resorcinolis, Ammonii chloridi, Chloralis hydratis	0.5 gram (gr. viiss);
Spiritus lavandulæ	100 c.c. (f3iiss).—M. (DARIER.)
℞ Pilocarpinae hydrochloridi	0.5 gram (gr. viiss);
Tincturæ cantharidis	5 c.c. (m lxxx);
Alcoholis	90 c.c. (f3ij);
Spiritus Jamaicensis, Spiritus camphoræ	10 c.c. (f3iiss);
Glycerini	4 c.c. (f3j).—M. (BROCQ.)

Sabouraud and Gougerot recommend a warning to the patient that at the start of the stimulating applications much hair will fall out; this represents a mechanical removal by the brushing of the scalp of all the diseased hairs.

Acne.—The treatment of acne differs little from that of seborrhea. Fundamentally, the preparations used should be more active, but account should also be taken of the sensitiveness of the skin, which may become irritated and even eczematous.

The acne pustule and certain particular forms of acne call for special kinds of treatment.

The *mild procedures* consist of washing with sulphur, tar or naphthol soap, followed by immediate rinsing, then, of sprays of sulphur water, followed by the use of rice powder containing sulphur.

The *active procedures* begin with the extraction of comedones and the dry massage-pétrissage, without the use of fats, recommended by Jacquet. The washings with medicated soap are then carried out at shorter intervals, the lather being allowed to remain on the skin for increasing periods. Over night, one of the sulphur lotions referred to above is applied with a brush. In the morning the sulphur is removed and, if indicated, a soothing paste applied.

The *exfoliative method* is applied in refractory cases, and consists in washing with naphthol soap or soft potash soap, or the application over the affected area of an exfoliative paste consisting of equal parts of lard, sulphur and soft soap. The soap is allowed to remain on the skin until the latter becomes irritated (five to thirty minutes); the irritation is then allayed with zinc paste.

The *pustules* are opened with the scarifier, evacuated, and then cauterized or wiped out, according to their size, with small wads of cotton moistened with Alibour's fluid, 10 per cent. silver nitrate solution, or 1 per cent. mercury bichloride or salicylic acid in spirit of camphor. Alibour's paste and cream are useful antiseptics.

Acne rosacea is attended with dilated vessels, which are treated either by superficial scarifications in a close cross-hatching or by electrolysis. The simple congestive lesions are treated by massage, facial gymnastics, very hot lotions, or by irritant applications (soft soap), the effect of which is then allayed with bland pastes.

In all refractory cases, of acne, notably in *acne keloid*, X-ray treatment should be used, and especially also cryotherapy, which acts very favorably on acne rosacea and keloid scars.

TUBERCULOSIS OF THE SKIN.

There are a number of varieties of tuberculous involvement of the skin, among which are included the *tuberculides*—skin disturbances developing on a tuberculous "soil" and constituting actual attenuated tuberculous manifestations.

Tuberculous Gummas.—When present only in small numbers and taken at the start, these can be removed surgically. Heliotherapy should be applied in their treatment only with caution.

In the first stage of the condition, the sclerosing method may be tried from the start or the gumma softened by the introduction into it of a few drops of some suitable fluid; at maturity, a puncture is made in healthy tissue and a medicated fluid injected.

Tuberculous Ulcer.—The treatment is either surgical excision if the patient is free of other manifestations of the disease, or cauterizations and destruction of the fungoid masses with the thermocautery or weak caustics, and dressings with powders or antiseptic pastes.

Fungous, Vegetative and Verrucose Tuberculosis. Anatomic Tubercle.—One should begin treatment at the start with energetic measures: Either excision, applications of strong caustics, Vienna paste, Unna's white paste, carbon dioxide snow, hot air (700° C.), or destruction with the thermocautery followed by X-ray treatment.

Lupus Vulgaris.—The treatment of lupus varies according to its clinical aspect, but more particularly according to the location and extent of the lesion, the age, social status and resisting powers of the patient, and the resources at the physician's disposal. In all cases the treatment should be begun as early and continued as long as possible. The healing process should be carefully watched and the practitioner should make it a rule to investigate the natural cavities of the body (ears, mouth and nasal fossæ in particular) for some hidden lesion or nidus capable of starting new islets of the disease.

The selection of a therapeutic procedure is based on the aggregate of these considerations, and the treatment of lupus, to be effective, must always resort to the combined action of several procedures. Patience on the part of the afflicted individual and skill and perseverance on the part of the physician are required to bring the treatment of lupus to a successful conclusion. Recovery is certain only where several years elapse without recurrence.

Surgical excision may be carried out alone or in conjunction with autoplasmic grafts. It is applicable to limited involvements of the extremities, trunk or neck, and also to destructive lesions of the face.

Scraping with the curet, in conjunction with *cauterizations* with the thermocautery, the galvanocautery, hot air or chemical caustics, and reinforced by a few terminal X-ray exposures, constitute a group of radical and severe procedures which destroy the disease but yield poor cosmetic results.

Quadrilateral linear scarifications are the treatment of choice in the majority of the varieties of lupus. They are readily carried out, available to all practitioners, and give good results, in particular thin and soft scars; such treatment, however, takes time.

The skin is cleansed with alcohol and allowed to dry, and with a series of scarifiers (flat needles) of varying sizes, with free, light strokes, and proceeding from below upward in order not to be inconvenienced by the blood, the operator cross-hatches the surface of the lupus, encroaching for 2 or 3 millimeters ($\frac{1}{12}$ or $\frac{1}{8}$ inch) on the

surrounding healthy skin, without hesitating to go down to the depth of the true skin, the resistance of which can be felt. The area is sponged and the bleeding stopped with hydrogen peroxide solution or a saturated solution of antipyrin. It is well to conclude the procedure with the application of a 1:16 solution of potassium permanganate to the scarified area; this solution, however, stains the skin brown, and some prefer to it 5 per cent. iodine in glycerin, 0.1 per cent. mercury bichloride solution, or Vidal's red plaster (red mercuric oxide, 3 parts; red oxide of lead, 5; diachylon plaster, 52), renewed morning and evening. The scarification is carried out once a week, and in order to obtain results not less than twenty, thirty or fifty treatments are required, and even more in certain obstinate cases. In the event of inflammation, the area should be sprayed a few times and covered with a dusting powder.

Galvanocauterization.—This measure is indicated in lupus of the mucous membranes and to bring about disappearance of certain deep or concealed lupous foci. The cautery tip is brought to a dark red heat and left in contact a few seconds in order properly to destroy the fungoid tissue. In cases of the elephantiasic type, similar cauterizations to a great depth are carried out under local anesthesia.

Finsen Treatment or Phototherapy.—This method is in all respects advantageous; it is suited more especially for lupus of the face and interdigital spaces, is applicable to children, and may add its slow, mild action to the scarification procedure. Unfortunately it requires costly equipment.

X-Rays and Radium.—The use of these agents is not yet well regulated and not all observers agree as to their efficacy. They are indicated in cases in which an infiltrated lupous area is to be brought down, a fibrous patch softened, or where it is necessary to prevent either a recurrence or the formation of a keloid scar.

With all the foregoing local procedures it is advisable to combine general treatment, *viz.*, that of torpid tuberculosis.

Lupus Erythematosus.—This is regarded as a tuberculide combining erythematous and atrophic tendencies. It is a capricious and obstinate disorder, alike capable of getting well spontaneously and of exhausting all therapeutic resources.

Some inflammatory cases require soothing treatment with anti-phlogistic applications.

Other cases are irritable and call for preparations which are bland or contain only mildly acting drugs. In the hyperkeratotic cases, applications of iodine, phenol, resorcinol, salicylic acid, naphthol, oil of cade or pyrogallol preparations are recommended.

Scarification sometimes gives good results. Darier recommends irritant applications of soft potash followed by soothing with zinc oxide paste, and Gougerot praises the effects of carbon dioxide snow, the application of which has been greatly simplified by the use of Lortat-Jacob's *cryocautery*. The cure of lupus erythematosus is now the outstanding success of cryotherapy, which is superior to all other methods in that it leaves no scar.

TUMORS OF THE SKIN.

I. Papillomatous Tumors.—Venereal warts, confined to the genitals, following local irritation, and kept up by vaginal discharges or deficient body hygiene, call more than all else for cleanliness, weak antiseptic lotions and free dusting with a mixture in equal parts of savin [*Sabina*, U. S. P. VIII], calomel and alum. When small and few, they may be made to disappear with caustics (chromic acid, zinc chloride), or removed with the curet after application of cocaine-adrenalin. Large vegetations call for surgery or the thermocautery.

Warts of the common variety sometimes disappear spontaneously. They may be cauterized with the galvanocautery or thermocautery. The X-ray, while very effective, has to be applied with caution. Nitric acid and the caustics in general should be avoided.

Vallet's method consists in cauterizing the wart by concentrating direct sunlight on it with a lens. Each wart is treated for a few seconds with a *point* of light or for a minute with a *spot* of light 3 to 5 millimeters ($\frac{1}{8}$ to $\frac{1}{2}$ inch) in diameter. After four or five days the dried and shrivelled superficial portions are removed with the knife. The procedure is repeated until the lesions have completely disappeared. Tincture of thuja [*Thuja*, N. F.], taken internally in doses of 60 to 80 drops a day, is also used externally by repeated applications several times daily. A few drops of it may be injected into the center of each wart with a fine, short-bevelled needle, the wart having previously been softened by prolonged immersion in hot water.

Molluscum contagiosum and *molluscum pendulum* are removed with the curet. *Xanthoma* and *xanthelasma* call for careful galvanocauterization.

II. Epithelioma.—Every epithelioma should be excised or destroyed *in toto*. Biopsy and histologic determination of the type of tumor are as necessary to illumine the diagnosis as to settle the therapeutic procedure to be used. The latter should also take into account the extent, depth and location of the lesion.

Lobulated or Spindle Cell Epithelioma.—According to Darier, the X-rays and radium are contraindicated in this condition, their use

inevitably making the tumor worse. Other observers assert that slowly, gradually and with many precautions, the development of the tumor can be checked by one or the other of these measures. Be that as it may, it is often possible to perform a free surgical excision of the lesions and neighboring lymphatics.

Tubular or Basal Cell Epithelioma (Flat, Cicatricial Epithelioma, Rodent Ulcer, Granulating Epithelioma).—In these cases, on the other hand, the X-ray and radium are triumphant. Whatever be the pathologic variety of the growth, it should be borne in mind that in the extensive, deep, granulating forms with glandular involvement, the surgeon may first be requested to remove the greater part of the tumor, the thermocautery and curet being the instrument of choice to draw the line between the healthy and the neoplastic tissues. The wound is dressed with powdered potassium chlorate and the scars irradiated.

Metatypical Epithelioma.—This is a third form of cutaneous epithelioma recently described, which can be distinguished from the basal cell variety by histological study or by its resistance to the X-rays.

From the latter point of view it constitutes, through the degree of its sensitiveness to the X-ray, a transitional form between the spindle cell and basal cell forms. True, we are far from having definite technics in the use of the X-rays and radium. While we are able to measure rather well the amount of irradiation, we still have much to learn about the quality of the rays selected by different filters.

Where X-ray equipment is lacking, superficial epitheliomas may be treated and cured by the *cauterization method*. All the epidermal granulations are removed with the curet or galvanocautery, and the lesion denuded and treated with the Cerny-Trunczek saturated arsenical solution: Arsenic trioxide, 1; water and alcohol, of each 50 parts.

The lesion is allowed to dry under a little cotton. A crust forms, which is removed after about ten days. If the tumor has been wholly destroyed, a definitely white cicatrix is seen to appear. If it is red or grayish, the solution must be applied further.

In desperate cases, the granulations formed are removed with the thermocautery, the above-mentioned arsenical caustic applied, the lesion dusted with potassium chlorate powder, pain combated with applications of anesthetic pastes (cocaine, orthoform), and general anti-cancerous medication instituted (cuprase, potassium and sodium silicate, 0.2 to 0.3 gram—3 to 5 grains—a day).

Sarcoma. Mycosis fungoides.—X-rays, radium, arsenic in high dosage (arsphenamin).

Keloids. Flat or Elevated Vascular Nevi.—Electrolysis or X-ray treatment, but especially, cryocauterization.

THE TREATMENT OF POISONING.

"Doctor, I wanted to try a chemical test and, first of all, I carefully introduced into a test-tube

—It would have been better, said the surgeon, to introduce your fingers into his throat."

Dr. Larivière to Homais.
(*Mme. Bovary*, by Flaubert.)

The **diagnosis** of the nature of the intoxication—an essential feature—should be based on the following four items:

1. The *information obtained from the patient* (when truthful; beware of drug users).

2. Actual *observation of the cause of the intoxication*.

These two items, when present, immediately supply the diagnosis, and it is altogether useless to waste one's time in clinical investigations, tests and talk. Prompt action is needed, and this is what the text from Flaubert, mentioned above, so powerfully expresses.

3. *Clinical investigation*.

Certain symptoms, such as the myosis of morphine, the mydriasis and reduced secretions of atropine, the lumbar pain and hematuria of cantharis, and the tetanic convulsions and trismus of strychnine poisoning, are practically pathognomonic.

The majority of toxicologic clinical tables are misleading, especially in regard to poisoning by alkaloids. Nevertheless, an attempt has been made to condense in the succeeding tables the clinical symptom-groups most commonly met with. It cannot be denied that they are sometimes very deceptive, and that frequently, in ignorance of the nature of the poisoning, one is reduced to the application of a symptomatic, pathophysiologic form of treatment.

4. *Chemical investigation*.

Such investigation is sometimes completely demonstrative (*e.g.*, in the case of arsenic).

Frequently it is disappointing (alkaloids, and aconite in particular).

At all events, it is nearly always slow and affords information only after some delay, being therefore of little practical utility in the stage when prompt action is necessary.

One should nevertheless carefully preserve the materials vomited or withdrawn by stomach washing and the suspicious contents of glasses and bottles. In these will sometimes be found obvious diagnostic evidence,

e.g., phosphorescent substances (phosphorus), laudanum, acids, alkalies, etc. In this event, they afford material for chemical investigation, even if it be only for the medico-legal analyst.

As for the **treatment**:

The chief measures indicated will be found condensed in the annexed tables.

In general, the following practical principles should be followed:

I. Eliminate, if possible, the toxic material:

(a) *Evacuation of the stomach*, effective especially in the early stages and if the poison has been taken by the mouth.

1. Induce *emesis* either by actively tickling the uvula or by administering an emetic, such as *ipecac*, 1.5 grams (22½ grains).

2. *Wash out the stomach*.

(b) *Evacuation of the bowel*, at a later stage:

1. A *purgative*: Sodium sulphate, 40 grams (1½ ounces) or, if not available, 3 tablespoonfuls of salt in a glass of water.

2. A *purgative enema*: Sodium sulphate, 30 grams (1 ounce), in a decoction of marshmallow, 500 cubic centimeters (1 pint), or, if not available, 3 tablespoonfuls of salt in a glass of water.

(c) *Elimination through the kidneys*:

1. Copious ingestion of fluid, diuretic decoctions (triticum, corn silk, lactose solution, etc.).

2. Various diuretics (squill, theobromine).

(d) *Elimination with blood*:

Blood-letting in varying amount, especially in the presence of cyanosis and high blood-pressure.

II. Neutralize the poison, if possible, *in situ*.

The principal neutralizing agents are briefly recalled in the subjoined tables.

III. Treat the dominant symptoms in as rational a manner as possible.

(a) Diffusible stimulants: In low blood-pressure with heart weakness.

(b) Artificial respiration, oxygen injections: In threatened asphyxia.

(c) Sedatives and hypnotics: In excitement and active delirium.

(d) Stimulating rubs and external heat: In cyanosis and lowered body temperature, etc.

IV. Administer a practically specific antidote, if such exists with reference to the type of poisoning under treatment.

POISONING BY DRUGS. Accidental or Criminal.

	SYMPTOMS.	EMERGENCY TREATMENT.
Hypnotics Opium and its derivatives (<i>Morphine, Codeine, etc.</i>).	Torpor, somnolence, profound sleep, coma. Myosis, loss of pupillary and corneal reflexes. Constipation. Vesical tenesmus.	1. Empty the stomach, if possible, by: <i>a.</i> Induced vomiting; tickling of the uvula; administration of ipecac or tartar emetic. <i>b.</i> Stomach washing. 2. Stimulate the nervous system; circulation and respiration. <i>a.</i> Peripheral stimulation, rubbing, etc. <i>b.</i> Strong coffee by mouth or rectum; caffeine, camphor in oil. <i>c.</i> Artificial respiration. <i>d.</i> Hypodermic injections of oxygen.
Chloral hydrate	Torpor, somnolence, profound sleep, coma.	
Barbital	Pupils generally contracted.	
<i>Hypnotics in general</i> ..	Progressive slowing of the circulation and later of the respiration (sometimes stertorous and deep for a varying period), even to the point of simulating death. Cyanosis and lividity. Gradual cooling of the body. Presence of chloral in the urine.	3. Venesection if pulse is strong, pressure high and cyanosis pronounced. 4. External heat if the tendency to cooling increases. 5. Against <i>opium</i> and <i>morphine</i> : Atropine, 0.001 gram. Against <i>chloral hydrate</i> : Strychnine, 0.003 gram.
Belladonna (<i>Atropine</i>)	Excitement, pulse acceleration, arrhythmia.	1. Empty the stomach (as above). Empty the bowel. Purgative enema.
Hyoscyamus (<i>Hyoscyamine</i>).	Mydriasis; bright eyes.	
Stramonium (<i>Daturine</i>).	Dryness of the mouth, throat and skin. Skin rash.	2. Diffusible stimulants: <i>a.</i> Coffee and caffeine. <i>b.</i> Alcohol, champagne, ether. <i>c.</i> Ammonia, ammonium acetate. <i>d.</i> Injections of ether. <i>e.</i> Amyl nitrite inhalations.
Aconite (<i>Aconitine</i>).	Often, but not always:	3. External heat: Rubbing, hot water bags, hot blankets.
Colchicum (<i>Colchicine</i>).	Vomiting, epigastric pain, more or less severe colicky pains, diarrhea.	4. Artificial respiration.
Conium (<i>Conine</i>).	More or less rapid prostration, which may eliminate the gastrointestinal stage.	5. Against <i>atropine</i> or <i>belladonna</i> : <i>a.</i> Tincture of pilocarpus or injections of pilocarpine. <i>b.</i> Morphine, 0.01 to 0.02 gram.
Tobacco (<i>Nicotine</i>).	Irregular heart-action. Slowed respiration.	Against <i>aconite</i> or <i>aconitine</i> : <i>a.</i> Atropine, 0.001 gram. <i>b.</i> Digitalis or digitalin.
Digitalis (<i>Digitalin</i>).	Progressive cooling of the body.	

POISONING BY DRUGS (*continued*).

	SYMPTOMS.	EMERGENCY TREATMENT.
Cocaine	Heart symptoms: Distress; small, irregular pulse. Visual symptoms: Dilatation of pupils. Respiratory symptoms: Dyspnea, labored breathing. Brain symptoms: Excitement, hallucinations.	1. Empty the stomach. 2. Stimulants: Coffee, brandy. 3. If required: Digitalis, laudanum.
Nux Vomica (<i>Strychnine</i>)	Trismus. Tetanic convulsive seizures. Exaggerated reflexes. Difficulty in breathing.	1. Empty the stomach. 2. Absorb poison with charcoal; tannic acid. 3. Nervous sedatives: Bromides and chloral hydrate in large doses; chloroform inhalations. 4. Silence, quiet and darkness.
Cantharides	Vomiting, epigastric pain. Diarrhea. Pain in the lumbar regions. Dysuria, with difficult, painful passage of bloody urine.	1. Empty the stomach and the bowel (with saline purgatives, avoiding oils). 2. Demulcent drinks: Barley, linseed, acacia solution, albumin water. 3. Laudanum or morphine. 4. Hot tub baths.

POISONING BY MINERAL SUBSTANCES

Accidental or Criminal.

	SYMPTOMS.	EMERGENCY TREATMENT.
Acids and Acid Salts (<i>nitric acid, hydrochloric acid, sulphuric acid, phenol</i>).	Burning and acid taste in the mouth and throat; pain in the esophagus and stomach; dysphagia. Intense thirst. Burn or eschar of the swollen lips and tongue: Yellow: Nitric acid. White: Hydrochloric acid. Black: Sulphuric acid. Acid vomiting, intensely painful: Acid to litmus. Effervescent with sodium bicarbonate. Sometimes bloody: Ulcerations.	Alkalies in large amounts: Magnesia, lime water, sodium bicarbonate, soapsuds. Milk, olive oil, thick gruel, acacia solution, albumin water. If required: Morphine, ether injections.

POISONING BY MINERAL SUBSTANCES (*continued*).

	SYMPTOMS.	EMERGENCY TREATMENT.
Alkalies (<i>caustic potash or soda, Javelle water, ammonia, etc.</i>).	Grayish eschar on the lips. Vomiting, alkaline to litmus. Diarrhea.	Acids: Diluted acetic acid, fruit juices (lemon, orange, etc.), citric or tartaric acid, diluted with water. Demulcent drinks: Albumin water, acacia solution, decoction of barley or linseed. Milk, olive oil.
Arsenic (<i>medicinal preparations, such as Fowler's solution or depilatory pastes; or rat poison</i>).	Violent epigastric pain. Intense thirst. Colicky pain. Dark-colored vomit (black, blue or green).	1. Empty the stomach. 2. Warm water, salt water in abundance. 3. Olive oil; lime water. 4. Demulcent drinks. 5. Diffusible stimulants. 6. Morphine, when required.
Mercury (<i>corrosive sublimate</i>)	Epigastric pain. Dysphagia. Intense thirst. Swelling of the lips and larynx. White eschar. Vomiting, with metallic taste.	1. Empty the stomach. 2. Albumin water. Sulphur water. 3. Demulcent drinks. 4. Stimulants. 5. Pilocarpine (0.02 gram). 6. Morphine, when required.
Lead (<i>salts of</i>)	Epigastric pain. Colic. Constipation. Constriction of the throat. Astringency and sometimes sweet taste in the mouth.	1. Empty the stomach. 2. Sodium or magnesium sulphate in 5 per cent. solution, by glassfuls. 3. Albumin water. 4. Milk.
Copper (<i>verdigris, blue vitriol</i>)	Dry throat and dysphagia. Colic and diarrhea. Vomiting, with taste of ink, sometimes characteristically blue or greenish.	5. Poultices with laudanum, or morphine, when required.
Phosphorus (<i>matches</i>).	Epigastric pain. Phosphorous, garlic-like odor of the breath. Vomitus phosphorescent in the dark.	1. Empty the stomach. 2. Copper sulphate, 0.05 gram pills every fifteen minutes. 3. Oil of turpentine, 2 c.c. every two hours. 4. Albumin water, lime water. 5. Milk. 6. Oxygen injections and inhalations.

POISONING BY FOODS.

	SYMPTOMS.	TREATMENT.
Botulism: <i>Sausages, ham, spoiled canned meats, vegetables or fruits (rancid, butyric odor). Bacillus botulinus.</i>	<p>Epidemic occurrence, after ingestion of canned goods. Onset of symptoms: 18 to 72 hours after ingestion of the food.</p> <p><i>Gastrointestinal disturbances, generally slight and delayed:</i> Gastric pain, nausea, sometimes vomiting. <i>Generally constipation.</i></p> <p><i>Characteristic paralytic symptoms:</i></p> <ol style="list-style-type: none"> 1. Ocular paralyses: Mydriasis, loss of light reflex, ptosis, strabismus, diplopia. 2. Pharyngeal paralysis: Dysphagia. 3. Laryngeal paralysis: Dysphonia, aphonia. 4. Paralysis of voluntary muscles. <p><i>Hypocricinic symptoms:</i></p> <ol style="list-style-type: none"> 1. Distressing dryness of the mouth, throat and nasal cavities. 2. Gastric hyposecretion: Anorexia. 3. Cutaneous hyposecretion: Cessation of perspiration. <p><i>Later bulbar symptoms:</i></p> <ol style="list-style-type: none"> 1. Respiratory disturbances: Shallow, irregular breathing. 2. Circulatory disturbances: Slow pulse, weak heart-sounds. <p><i>Negative features:</i></p> <p>No fever. No eruption. No sensory or mental disturbances. Paucity of digestive symptoms.</p>	<p><i>Prophylactic:</i></p> <ol style="list-style-type: none"> 1. Discard all suspicious canned goods, especially with a butyric acid or rancid odor. 2. Avoid raw sausages, pork products, salt fish and meats. These should all be cooked before use. <p><i>Curative:</i></p> <ol style="list-style-type: none"> 1. Empty the bowel with a saline purgative. 2. Free administration of physiologic salt solution (injections, enemas). 3. Symptomatic treatment. Strychnine for paralysis. Pilocarpine hydrochloride, 0.01 to 0.02 gram by injections, for reduced secretions. 4. Antitoxic serum, still under investigation.
	<p>Ordinary food poisoning: <i>Mushrooms, mussels, spoiled meats.</i></p> <p><i>Very acute digestive disturbances:</i></p> <p>Vomiting. Diarrhea. Abdominal pain.</p> <p><i>Neurovascular disturbances:</i></p> <p>Stimulation, then depression. Small pulse. Low blood-pressure. Sweating. Faintness. Tendency to collapse.</p>	<p>Empty the stomach: Emetics, stomach washing.</p> <p>Empty the bowel: Saline purgatives.</p> <p><i>Diffusible stimulants:</i> Coffee, alcohol.</p> <p><i>External heat.</i></p>

POISONING BY FOODS (*continued*).

	SYMPTOMS.	TREATMENT.
Alcohol.	Excitement. Delirium. Coma,	<i>Empty the stomach:</i> Emetics, stomach washing. <i>Diffusible stimulants:</i> Ammonium acetate mixture. Strong coffee. <i>General rubs.</i> <i>External heat.</i> <i>Inhalations</i> of ammonia or amyl nitrite.

CARBON MONOXIDE POISONING.

This is one of the commonest forms of poisoning, and is of great practical importance, especially in the cities in winter. It is the source of countless vague and obstinate complaints (headache, neuralgia, anemia, weakness, etc.); uninfluenced by any ordinary treatment, these yield as if by magic to fresh air. In diagnostic studies, due attention should be paid to this frequent cause of symptoms. IT SHOULD BE THOUGHT OF ALWAYS, and a persistent hunt be carried on for defective chimneys, stoves with retarded combustion and faulty illuminating gas appliances. (A device known as the Guasco toximeter, which gives a relatively accurate reading of the amount of carbon monoxide in the air, is in all respects serviceable for systematic use in buildings that are poorly ventilated and heated by dubious methods).

Acute Poisoning:*First Stage.*

Heaviness in the head and headache, especially temporal in location.

Whistling or buzzing in the ears; dazzling sensations and dizziness.

Retrosternal pain.

Second Stage.

Vomiting (inconstant).

Convulsions.

Respiratory disturbances, irregularity, pauses.

Third Stage.

Coma.

If the patient survives:

Fourth Stage.

Sequelæ.

- (a) Motor disturbances: Pareses or paralyses, manifestations of multiple neuritis, tremor.
- (b) Trophic disturbances: Edema, necroses.
- (c) Sensory disturbances: Neuralgic pains.
- (d) Mental disturbances: Confusion.
- (e) Various cardiopulmonary disturbances: Congestive states, edema, hemoptysis, and especially anemia with urobilinuria and often jaundice and albuminuria.

Treatment.—1. First and foremost: Remove the patient from the vitiated atmosphere and give him plenty of FRESH AIR, reinforced by OXYGEN inhalations and hypodermic injections. [Addition of 8 to 10 per cent. of CARBON DIOXIDE to the oxygen to be inhaled improves the results, restoring the breathing quickly to normal and thereby favoring displacement of carbon monoxide from the blood by the oxygen inhaled.—TR.]

2. BLOOD-LETTING of varying amount, in conjunction with injections of caffeine, camphor in oil and ether.

3. If indicated, in the event of *respiratory disturbance: Faradic stimulation of the phrenic nerves and rhythmic traction on the tongue.*

4. For the sequelæ, the usual *symptomatic measures.*

Chronic Poisoning:

This is evidenced by certain "stigmata," the combined presence of which is asserted to be often sufficient for a diagnosis. The latter should, however, always be based on: 1. The clinical examination. 2. Spectroscopic and chemical examination of the blood. 3. Study of the history. 4. Whenever possible, determination of the content of carbon monoxide in the vitiated air.

The most usual stigmata of chronic carbon monoxide poisoning are:

Headache, dizziness and sensory disturbances.

Anemia and loss of weight

Physical and mental asthenia.

Sleeplessness at night and somnolence in the daytime.

Gastric disturbances.

Neuralgic pains.

Other manifestations, while not as common as the foregoing, are not exceptional:

Trophic disturbances.

Sensory disturbances (hyperesthesia, anesthesia and paresthesia).

Localized motor disturbances (comparatively rare).

Amnesia.

The occurrence of delusional manifestations, acute or chronic, simple insanities or syndromes more or less resembling progressive general paralysis is possible, but has not been definitely proven.

Treatment.—This consists mainly in:

1. *Removing the patient from the toxic influence:* Fresh air, a stay in the mountains, country or at the seashore.

2. *Promoting blood regeneration:* (a) Serum of bled animals by hypodermic injection or by the mouth.

(b) Oxygen treatment (hypodermic injections).

3. *Appropriate symptomatic measures.*

DISEASES OF THE EAR.

By G. LAURENS, M.D.

Treatment of diseases of the ear by the practitioner requires on his part a knowledge of certain simple facts relative to the anatomy and physiology of the organ and familiarity with the technic of examination of the external auditory meatus and drumhead. Certain considerations must here be presented, moreover, concerning the procedures he can and should undertake in this connection and, on the other hand, concerning those he should not undertake.

Thus formulated, the problem is easily solved, and it becomes possible in practice to recognize and treat the commoner affections of the ear, the diseases of the external auditory meatus, those of the tympanum, and in particular, all varieties of otitis media.

On the basis of this indispensable knowledge, by a simple technic, and with few instruments, *viz.*, an ear speculum and a head-mirror, the practitioner can, in the very great majority of cases, do good, practical ear work.

ECZEMA OF THE EAR.

To treat eczema effectively, it is sufficient to know that the condition is due nearly always to some irritation of the integument (inflammation of the meatus due to the pus in otorrhea, the dressings in mastoiditis, the wearing of ear-rings, etc.); sometimes there are no such lesions, however, and "arthritism" is the sole cause of the disturbance.

Clinically, there are two forms of eczema, **acute** and **chronic**, as in all other regions of the body. All the symptoms of ordinary eczema are to be noted in these cases. When the disease is **acute**, there is redness with scattered vesicles secreting a serous fluid and finally becoming covered with crusts. Itching and scratching are the rule. **Chronic** eczema is characterized by the presence of whitish scales, with thickening of the integument, sometimes of elephantiasic proportions. The feature especially to be noted is **extension of the eczema from the auricle to the auditory meatus**; this occurs almost regularly. Now, this eczema of the meatus leads to very unpleasant results, *viz.*, seropurulent discharge, swelling of the walls of the canal and obstruction by pus and products of desquamation. Furthermore, *intense itching* and the consequent *scratching* keep up the local dermatitis.

In eczema of the ear, one should *avoid*: 1. Applying moist dressings and performing antiseptic irrigations, even with aseptic fluids, as these would spread the infection; eczema abhors water. 2. Treating only the general condition.

The eczema should first be treated directly, according as it is acute or chronic; then, after recovery has occurred, the *cause* of the eczema should be dealt with.

I. ACUTE ECZEMA.—The indications are:

1. **To allay the itching** and irritation of the skin by the use of stable powders such as:

℞ Talci purificati 20 grams (3v);
Zinci oxidi pulveris 4 grams (3j).—M.

which will form a coating over the affected tissues and protect them from the contact of the air. The diseased area is dusted over several times daily with this powder on a small wad of absorbent cotton.

2. **To cause the crusts to drop off** by softening the integument. The patient should be instructed to daub the following ointment with cotton on an applicator over the whole auricle and its recesses two or three times a day:

℞ Zinci oxidi 2 grams (3ss);
Petrolati puri 20 grams (3v).—M.

The fatty substance has for its purpose to soften and swell out the crusts and cause them to loosen spontaneously, without traumatism nor washing. The procedure should be repeated until the surface is thoroughly clean, for several days if necessary. There should be no dressing over the ear, except at night, during which the patient should be instructed to apply over the auricle a small compress of sterile gauze covered with the ointment, to be introduced into all the recesses of the ear and held in place by a bandage around the head. Unna's paste also gives good results:

℞ Kaolini puri 30 grams (3j);
Olei lini 30 c.c. (f3j);
vel glycerini 24 c.c. (f3vj);
Zinc oxidi,
Plumbi subacetatis āā 20 grams (3v).
Fac pastam.

3. **After the crusts have fallen off**, the talc and zinc oxide powder should be resumed.

4. In **acute eczema of the auditory meatus**, the latter must be freed of the obstructing pus and concretions with which it is filled. For this purpose, an aseptic irrigation should be carried out, the

canal very carefully dried with several wisps of cotton on applicators, and a small wick of sterile gauze, 5 centimeters (2 inches) long and 1 centimeter ($\frac{2}{8}$ inch) wide, well impregnated with the zinc oxide ointment, introduced into the canal. This wick should be renewed every day, after a cleansing with cotton on an applicator. A remedy which sometimes gives excellent results in the treatment of subacute or chronic eczema is Alibour's fluid (see p. 1709) diluted 1:4.

II. CHRONIC ECZEMA.—Following is a plan of treatment:

1. The affected surfaces should be **cleansed** and the crusts removed with applications of zinc oxide ointment or the introduction of gauze wicks impregnated with the ointment into the meatus.

2. **Dry eczema** should be dealt with as follows: A choice may be made between the use of silver nitrate and painting the external auditory canal and auricle twice daily with a brush bearing one of the following *ointments*:

℞ Ichthyolis 1 gram (gr. xv);
 Petrolati 10 grams (3iiss).—M.

Or:

℞ Picis pini 1 c.c. (m xv);
 Petrolati 10 grams (3iiss).—M.

Or:

℞ Acidi salicylici 0.5 gram (gr. viiss);
 Amyli pulveris,
 Zinci oxidi pulveris 5 grams (gr. lxxv);
 Petrolati 20 grams (3v).—M.

The latter formula is known as Lassar's paste.

The patient should be seen frequently—on alternate days, or oftener, if necessary—the ear inspected with the speculum and soiling of the canal with fatty accumulations prevented.

If the ointments fail, applications of **silver nitrate** by the physician himself should be resorted to. On alternate days at first, then every three days, the canal is cleansed with dry cotton on an applicator under direct visual control through the speculum. Crusts and scales are removed by rubbing; if necessary, a little liquid petrolatum may be used on the cotton. When the canal is thoroughly dry, a little 5 per cent. silver nitrate solution is poured in a dish, and with several brushes dipped in this solution, the walls of the canal are rubbed repeatedly for fifteen seconds. Sometimes the patient experiences a smarting and burning sensation, but no harm follows. Two or three such treatments, or at most five or six, are sufficient to bring about recovery. It is a good plan, especially in eczema of the canal, to

conclude the treatment with the introduction of a small wick of dry, sterile gauze to keep the affected tissues apart.

If the patient cannot be treated directly by the physician himself, or can be observed only at long intervals, he may be instructed to make instillations of 2 per cent. silver nitrate in the ear.

Once daily, with his head tilted over a table, and after applying a coating of petrolatum over the auricle, pretragic region and concha in order to avoid blackening of these structures by the silver nitrate, the patient has one of his associates fill the auditory canal with a medicine dropperful of silver solution. This solution he retains for ten minutes, after which the canal is dried with several tampons of absorbent cotton. This procedure is quite painless.

All irrigation of the ear should be interdicted. The patient should be informed that the dark flakes resulting from the action of the silver salt can be removed later. Scratching of the ear should be strictly forbidden. The ear must be examined after five or six days by the physician, in order that a cleansing of the canal, which will be found lined with dark crusts, may be proceeded with. The physician should then paint the tissues with a stronger solution (4 per cent., or even 10 per cent., as there is no danger in its use), and in two weeks' time improvement amounting almost to recovery will have occurred.

Treatment of the cause of the eczema is indispensable:

Locally, treatment of the chronic otorrhea, daily dressing of the mastoid wound, or removal of the ear-ring is indicated; in short, *prophylactic* treatment should be instituted. In particular, the patient should be forbidden to scratch his ear with the countless procedures and instruments which his ingenuity and itching may suggest. For the daily cleansing of the ear, water and soap should be warned against and a wisp of cotton moistened with Cologne water or alcohol recommended. The patient should also be advised to avoid stuffing cotton in his ears, as this is a cause of itching and irritation.

The *general condition* of the patient, if it is the sole factor in the ear disorder, should receive due treatment; little need be said here as to the diathetic treatment and the diet to be prescribed.

FURUNCULOSIS OF THE EAR.

I. PROCEDURES TO BE AVOIDED.—Do not try to relieve the pain by prescribing supposedly anodyne preparations, laudanum, balsams, etc.

No irrigations, miscellaneous injections nor cocaine drops; these are useless, ineffectual and poorly borne.

Above all, no early incisions; incise only at the right spot, when there is pus, and not somewhere else.

In furuncle of the ear, in view of the relative non-occurrence of complications, it is better to hold back than to carry out inopportune measures.

II. PROCEDURES INDICATED.—Medical Treatment.—At the start, a liquid diet and analgesics (acetylsalicylic acid, amidopyrin, or opium if necessary).

The abortive treatment is indicated. The small area of inflamed skin at the seat of the furuncle may be touched with a narrow wad of cotton slightly moistened with:

℞ Iodi 2 grams (ʒss);
Acetoni 6.5 c.c. (℥cv).—M.

or, instillation of a few drops of alcohol into the meatus every two hours may be advised, such instillation to be made either directly or on a wick changed daily.

If this treatment fails, instillation of a few drops of the following mixture, previously heated, into the canal every two hours may be prescribed:

℞ Solutionis hydrargyri chloridi corrosivi (1:1000) .. 25 c.c. (fʒvj);
Glycerini 20 c.c. (fʒv).—M.

or better, the insertion into the canal of a small wick of soft gauze over which the patient may pour the above fluid every two hours. The wick should be withdrawn if it is poorly borne; otherwise, it should be changed daily. In addition, hot moist compresses should be made over the whole region of the ear and renewed eight or ten times a day. This plan of treatment sometimes leads to resolution.

Surgical Treatment.—When should the furuncle be incised? When the abscess forms a small, red, acuminate, very painful and depressible elevation and is accompanied by post-auricular lymphangitis.

Instruments needed: A narrow knife or needle for puncture of the drum; several applicators, garnished with cotton.

Anesthesia: Application over the boil of a small ball of absorbent cotton of half pea size and moistened with two or three drops of Bonain's anesthetic fluid:

℞ Cocainæ hydrochloridi,
Mentholi,
Phenolis āā 1 gram (gr. xv).—M.

Antisepsis is instituted by pouring in pure hydrogen peroxide solution or absolute alcohol and allowing it to remain for five minutes.

The knife should be held like a pen. The acuminate point of the furuncle is **incised** deeply and freely, beginning at the furthestmost point and drawing the blade quickly toward the operator. The incision should be made perfectly the first time in order not to have to repeat it, as the pain is intense; the patient's head should be firmly held during the procedure. The contents of the furuncle, pus and central core, are *evacuated* by repeated pressure from the periphery. This "expression" of the pocket is extremely painful; the operator should not, however, allow himself to be deterred by the patient's screams and struggles. The cavity should then be **painted** with *tincture of iodine* and **drained** with a small wick of very fine gauze inserted between its margins. The pus and blood are *cleaned out* of the canal, and lastly, a **dressing** inserted in the form of a long wick of gauze moistened with 1:1000



Fig. 350.—Furunculotome.

mercury bichloride solution and passed into the canal. Cotton is placed in the concha.

Redressings.—These should be carried out daily by the physician. No irrigations. Iodine applications and an occlusive dressing are indicated.

Recurrences must be prevented.—For this purpose: (1) *Advise instillation* into the canal morning and evening for two weeks of a half teaspoonful of absolute alcohol. (2) *Forbid* absolutely the introduction of foreign bodies (matches, ear-picks, hairpins) into the ear to relieve itching. (3) *Treat the cause of the itching*, which is nearly always eczema, by the application of 5 per cent. silver nitrate solution twice weekly.

In recurring furunculous otitis, vaccine treatment is indicated.

IMPACTED CERUMEN.

I. PROCEDURES TO BE AVOIDED.—Introduction into the auditory canal of any *instrument*—forceps, probes, etc.—to remove the wax. The procedure is tempting, but dangerous.

II. PROCEDURES INDICATED.—First of all, the patient should be reassured, as he is anxious about his deafness. The physician should remark that he observes wax plugging the ear, which is in all likelihood the cause of the deafness, and that the procedure

required is to remove the wax in order to permit of examination of the drum and internal ear.

The indications in the treatment are these: To soften the cerumen, which is sometimes hard and adherent, and to prevent recurrence.

1. **Softening the Cerumen.**—*Quick Method:* Fill the canal with hydrogen peroxide solution, the loosening properties of which are well known. Five minutes later the wax plug can often be syringed out.

Slow Method: Prescribe instillations twice daily of:

℞ Sodii carbonatis	2 grams	(5ss);
Glycerini	16 c.c.	(f3ss);
Aquæ	20 c.c.	(f3v).—M.

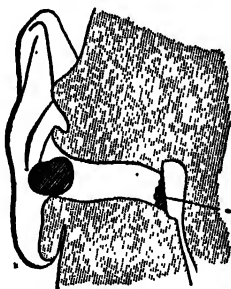


Fig. 351.—Removal of a wax plug.

Drying and direct inspection after removal of the plug are necessary, as a drop of water near the drumhead or a portion of the wax may remain, causing partial deafness to persist.

The auditory canal is to be filled with a little of this mixture, previously warmed on a water-bath. It is to be allowed to remain for five minutes, and the canal then dried with absorbent cotton. On the third day the cerumen, softened and pasty, is to be removed.

2. **Removing the Plug.**—*Wash out* the ear with a hydrocele syringe and $\frac{1}{2}$ to 1 liter of warm, boiled water, without antiseptics. The jet of fluid should be directed well against one of the walls of the canal, and will then expel all of the wax in one or several masses, to which hairs are sometimes adherent. This result is followed by a cry of astonishment or dismay on the part of the patient, who is apt to protest loudly and insist that all due hygienic care has been taken of the ear canal. Whereupon the physician should reassure the patient, allay his disgust, and point out that it is precisely the extra care taken of the ear with sponge-holders, hairpins, etc., that has been mainly responsible for the condition.

The irrigation being finished, *the water remaining in the ear should be sponged out* with cotton; in nine out of ten cases the hearing is at once restored, to the great joy of the patient. The latter should not be allowed to leave until the *meatus* has been *filled with cotton*, which should be retained for one day, in order to avoid inflammation of the canal.

3. Prevention of Recurrence.—The introduction of cleansing devices into the ear should be forbidden, the patient taught how to proceed with the toilet of the ear, and the chronic eczema also treated if there is itching. A warning should be given that the cerumen may recur in spite of these precautions if the meatus is narrowed, sharply curved and there is excessive glandular secretion.

FOREIGN BODIES IN THE EAR.

Foreign bodies are common in children and entail much more risk through awkward attempts at their removal than through their mere presence.

Diagnosis.—A child will nearly always deny the introduction of a foreign body, or at least will avoid confessing the fact.

The symptoms on account of which the physician's advice is sought are these: 1. Obstruction of the ear with **deafness**. 2. **Inflammatory conditions**, *viz.*, otitis externa with redness of the meatus, discharge, etc., caused by the presence of the foreign body or the manipulations carried out for its extraction.

One look through the speculum and the diagnosis is plain.

Treatment.—This resolves itself into the following items: What the physician must not do; what he may do, and what he should advise.

I. What the Physician Should Not Do.—This is what he does do sometimes when the child has admitted his wrong-doing, but gives no details. With the best of intentions, he at once takes an instrument, such as forceps, a probe, or a grooved director and sets about removing the offending body. In doing so, without having used the speculum, he runs the following risks:

(a) Of entering the normal ear, which contains no foreign body, and traumatizing it.

(b) Of entering the affected ear, already evacuated, the foreign body having left it soon after it got in.

(c) Of *pushing the foreign body in* to the depths of the canal. It should be remembered that the canal is shaped like an hour-glass, with its narrowest portion at the middle. If the foreign body is rather large, it will be pushed back beyond this narrow portion, become wedged in the bony canal and be no longer removable. There

then results sometimes a traumatic otitis externa, a perforation of the drum, or retention of pus if there has been a pre-existing otorrhea. Thus, I was once called upon to extract from the labyrinth of a woman a piece of curet broken by an operator who had attempted to extract a foreign body which was no longer in the ear!

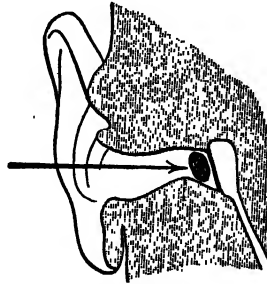


Fig. 352.—Foreign body pushed in by a probe into the bony canal, behind the isthmus.

II. What the Physician May Do.—1. *Insert an Aural Speculum and Inspect the Ear.*—He will thus be enabled to observe: The *presence* or *absence* of a foreign body; its *nature*, inanimate or living (in the latter case—fly or mosquitoes, larvæ, etc.)—instil oil to asphyxiate the animal, and

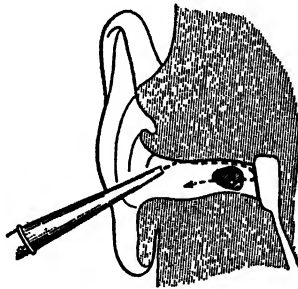


Fig. 353.—Removal of a foreign body from the ear.

The stream of fluid is directed against the upper or posterior wall of the meatus. It passes between the wall and the foreign body, is thrown back by the drumhead and carries the offending body toward the exterior.

syringe it out); nearly always it is a pearl or small pebble; its *consistency* (if it is a *soft* body that has swollen, *e.g.*, a bean or pea, shrink it for a few days with instillations of absolute alcohol); its *position* in the meatus or tympanum, and especially, the *condition of the walls* of the canal, which may be swollen, red and ulcerated by reason of previous clumsy attempts at extraction or the presence of the foreign body itself.

Before the extraction, the otitis externa should be allayed by instillations of oil, or better, of absolute alcohol.

The physician should abstain from all investigation with the probe unless he is highly experienced.

2. *Removal of the Foreign Body by Means of Injections.*—This is a harmless procedure, effectual in the very great majority of cases, though sometimes requiring a large number of sittings. Two or three liters (quarts) of water are run in at each sitting. With a little patience the pebble will appear.

3. *Difficulty of Extraction.*—This is due to *wedging* of the foreign body or to *otitis externa*. In such cases, instillations of glycerin or absolute alcohol should be carried out for several days.

III. **What the Physician Should Advise.**—If he is *unable to remove* the foreign body by irrigations, or if the foreign body has brought on *otitis media* with retention, he should lose no time in advising the patient to consult an otologist, who may either:

1. Proceed with the extraction by the natural route with the aid of suitable instruments, levers, hooks or forceps. Or:

2. Operate under general anesthesia (incision in the post-auricular sulcus, detachment of the membranous canal, and section of the latter).

ACUTE CATARRHAL OR SEROUS OTITIS MEDIA.

I. **What Not To Do.**—Such an otitis should not be passed over as a negligible quantity, nor the statement made at each recurrence that “the child will outgrow it.” Nor should the mother be told, when she consults the physician on account of lack of concentration on the part of the child, that “there is nothing to worry about.” Nor should an earache or spell of deafness be treated by the physician, when he is called, without his looking into its cause.

The patient's hearing is at stake.

II. **Measures Indicated.**—1. Treatment of the symptoms (pain, inflammation of the tympanum), as well as of the cause (rhinitis or tonsillitis). 2. Special treatment in case deafness persists. 3. Prophylactic treatment.

1. *Symptomatic Treatment.*—A 2 per cent. solution of pure phenol in neutral glycerin forms an excellent analgesic and resolvent preparation.

The ear should be filled with a little of this solution, previously warmed on a water-bath. It should be retained for five minutes.

and the ear then dried and plugged with non-absorbent cotton. This procedure is to be repeated every two hours.

At the same time the nose or throat, constituting the cause of the otitis, should be cared for with suitable ointments or inhalations. After eight or ten days the patient should be much improved or have recovered. If not:

2. *Inflation Treatment*.—Opening up of the Eustachian tube and tympanum by Politzerization, or better, catheterization of the tube, is then definitely indicated; otherwise deafness may become definitely established.

3. *Prophylactic Treatment*.—That abnormality of the nose, nasopharynx or pharynx play the principal rôle in the induction of the otitis has already been noted. Recurrence of the latter should, therefore, be prevented by applying the necessary causal treatment, *e.g.*, treatment of the rhinitis or pharyngitis, restoration of patency of the nasal passages if there is hypertrophic rhinitis, removal of mucous polyps, and especially, removal of the tonsils and adenoid vegetations.

The causes of *obstruction* and of *inflammation* are thus eliminated.

ACUTE SUPPURATIVE OTITIS MEDIA.

What Not To Do.—*Acute suppurative otitis media must not be looked upon as an ordinary affection which always gets well of its own accord.* Appendicitis, we are told, is also often spontaneously recovered from. But it should not be forgotten that the ear and the appendix both constitute closed cavities in the event of abscess formation and that rupture may either be favorable, through the drum or into the cecum, or, on the other hand, unfavorable, into the meninges or peritoneal cavity.

A.—BEFORE RUPTURE OF THE DRUMHEAD.

One should avoid:

1. Infecting the ear with miscellaneous analgesic and antiseptic preparations, so called. It is a poor policy to turn the auditory canal into a dumping-place for all the sedative preparations in the Pharmacopœia.

2. Prescribing irrigations, which are useless, since there is nothing to wash out, and painful, because the drumhead is inflamed.

3. Waiting until the drum ruptures of its own accord. The patient continues to suffer until such perforation occurs, and while nature, in rupturing the drumhead in nine cases out of ten, takes charge of the task which the physician is unwilling to assume, in

other instances the membrane refuses to yield, and the responsibility for serious complications is incurred.

In an ordinary abscess or cellulitis, incision is resorted to without hesitation; why act differently in the case of the ear? Many instances of mastoiditis in which I have been called upon to operate were due to the fact that the otitis had not been dealt with properly at the start. *There should be no dread of incising the drumhead*; the procedure has never made any patient deaf. But certainly, it may be answered, it does not entirely protect the otitic patient from mastoid or craniocerebral complications. This is true, but is surgery all-powerful?



Fig. 354.—An extensive perforation of the tympanic membrane.

Where the perforation is very large, *e.g.*, in otitis in the eruptive fevers, it appears to the observer as a dark spot.

B.—AFTER RUPTURE.

One should avoid:

1. Insufficient drainage. Accordingly, the tympanic membrane should be incised freely and not merely punctured with the paracentesis needle.

2. Prescribing daily irrigations and discontinuing all supervision of the ear, with the statement that recovery from the otitis is about to take place. This is a serious mistake. The mere statement of the patient that his ear has "stopped running" should not be considered as constituting recovery. With the otoscope the physician should make certain that the tympanic membrane has healed; he should also make sure that the hearing has returned to normal and that there is no persisting chronic otorrhea.

3. Sinning in the opposite direction by carrying out too active a treatment. Applications to the drumhead should not be repeated too often, and there should be no traumatism nor punctures repeated three or four times. No surgical wound should be maltreated.

If, perchance, the tympanic membrane should be constantly closing up and the perforation blocked with fungoid masses, the proper course is no longer to use the speculum but to investigate the mastoid.

Measures Indicated.—*Suppurative otitis should be treated like any other abscess, i.e., surgically and aseptically, but perhaps with still greater care, on account of the vicinity of the abscess to the mastoid and meninges. A preventive, prophylactic treatment should be prescribed.*

A.—BEFORE PERFORATION OF THE DRUMHEAD.

The indications are:

1. To *allay and overcome the inflammation.*
2. To *incise the abscess* when it has formed, *i.e.,* to perform *paracentesis* of the tympanic membrane.

I.—Sedative, Resolvent and Antiseptic Treatment.—This treatment should be similar to that of catarrhal otitis: *Ear baths* of 2 per cent. phenol in glycerin every two hours in adults or children; instillations of liquid petrolatum to be substituted in infants.

Application of hot, moist compresses over the ear and mastoid region, to be renewed every hour.

Treatment of the nasopharyngeal inflammation by means of a nasal *ointment*: A piece of the following ointment of the size of a pea is to be sniffed up in each nostril three times daily:

R Camphoræ	0.2	gram	(gr. iij);
Eucalyptolis	0.25	c.c.	(m iv);
Petrolati	20	grams	(3v).—M.

Hot gargles are also indicated.

II.—Incision or Paracentesis of the Tympanic Membrane.

When should the drumhead be incised?—When there is pus, in order to prevent retention of the latter.

When will the physician know that there is pus in the tympanum? In this connection he should be guided by a process of reasoning combined with otoscopy. The procedure is indicated when the various symptoms of abscess are seen to develop: 1. If there is fever with persistent *general* or *meningeal manifestations*. 2. If *pain* is severe. 3. If the local signs are becoming more marked: *Bulging* of the tympanic membrane pushed out by the pus; pronounced pain and swelling of the *mastoid*. 4. In the otitis of *infectious diseases*, in order to obviate destructive results.

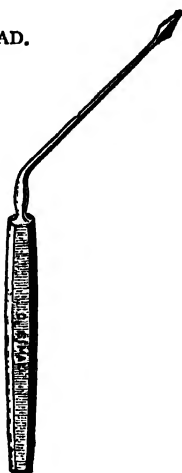


Fig. 355.
Myringotome.

As a rule, *by the evening of the third day* the tympanic membrane should have either opened spontaneously or been opened by the physician.

Paracentesis should also be carried out under the following two circumstances: 1. If the opening in the drumhead, whether natural or artificial, is *insufficient* and is followed by *retention* symptoms (fever, pain in the mastoid, headache), it should be enlarged, to provide better drainage. 2. When the perforation is situated in the *upper part* of the drum membrane, paracentesis should be carried out at a dependent point for similar reasons.

TECHNIC OF PARACENTESIS.—The auditory canal should be *disinfected*

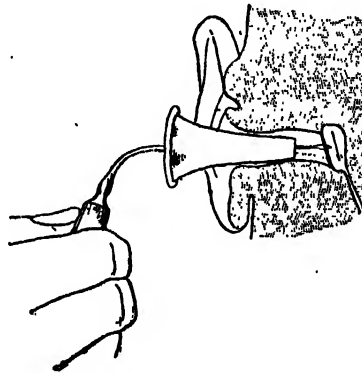


Fig. 356.—Incision of the drum membrane from above downward.

and cleansed with a bath of hydrogen peroxide solution or a cleaning out with alcohol.

Anesthesia of the tympanic membrane should be instituted in most children and in adults, as the incision is very painful. Bonain's combination should be applied to the membrane several times in succession:

R^x Cocainæ hydrochloridi,
Mentholis,
Phenolisãã 1 gram (gr. xv).—M.

Ten minutes later, the membrane is dried with cotton and is seen to be *white* in color, as though it had been sprayed with ethyl chloride.

In young children, no anesthesia should be used; speed in operating and a firm hold on the head, hands and shoulders are preferable; the child should preferably be operated while lying on a bed.

The patient's head should be well supported, and his attention concentrated upon something other than the knife. Accordingly, he may be told to hold the arms of the chair as tightly as possible.

In *incising the membrane*, *illumination* should be good, and in order that the operator's hand shall not be in the way of the light rays entering the ear, it should be held at a higher level than the latter. A speculum as large as can be used is inserted, the myringotome (previously boiled) introduced, and the incision made where the drumhead is strongly prominent, and as low down as possible. The opening made should not be a puncture, but an incision 4 or 5 millimeters ($\frac{1}{8}$ or $\frac{1}{6}$ inch) long.

The instrument should not be passed deeply into the tympanic cavity, as though to transfix everything; only about 3 or 4 millimeters' distance ($\frac{1}{8}$ or $\frac{1}{6}$ inch) separates the tympanic membrane from the inner wall of the drum, which has not been anesthetized and which might be seriously injured. The membrane should, there-



Fig. 357.—Line of incision for opening of the tympanum.

fore, be entered at the upper end of the proposed incision, very gently, as though the operator wished to pierce the pellicle of an egg, and a distinct cut then be made from above downward for a distance of 3 to 4 millimeters. The instrument is now withdrawn and the patient requested to make expiratory efforts with the mouth and nose closed, thus promoting the escape of the pus. An ear bath with neutral, full strength hydrogen peroxide solution is given, the ear dried five minutes later, and a plug of cotton inserted at the meatus.

B.—AFTER PERFORATION OF THE DRUMHEAD. DRESSINGS.

This question may be considered from two standpoints, *viz.*, according to whether one favors dry or wet dressings, and according to whether the physician is personally caring for the otitic patient every day or is allowing the patient to carry out the treatment himself under his supervision.

If the **dry dressing** is used, the otologist or the general practitioner cleans out the auditory canal himself morning and evening, then in-

roduces a wick of aseptic gauze for the purpose of draining the middle ear and preventing secondary infection. A bandage about the head completes the procedure.

This plan of treatment is inapplicable in hospitals and in the country. And, in general, there should not be two different therapeutic procedures in otitis, the one, complicated, for persons of the upper strata of society, and the other, a simple, popular procedure. For fifteen years I have been an advocate of **wet dressings** applied by the patient himself, and this treatment has the advantage of being applicable to all classes of persons. It is my belief that once the otitis is "opened," neither the otologist nor the general practitioner can do anything more; that the suppuration runs a cyclic course like an attack of pneumonia, of typhoid fever, etc., and that the rôle of the practitioner is limited to one of supervision of the case. Acute otitis is cured just as well and as quickly in this manner as with the dry dressings.

TECHNIC OF THE DRESSINGS.—The dressing should be renewed morning and evening, or three or four times a day if suppuration is profuse. The procedure includes *instillations* of pure *hydrogen peroxide* solution with boric acid into the ear for two or three minutes. These instillations are to be repeated two or three times at each sitting in order to clear the auditory canal of the pus it contains. When the solution has frothed sufficiently it should be sponged out with cotton.

These peroxide ear baths should be continued until the otitis has cleared up.

Urgent recommendations should be made to the patient regarding *asepsis* and the washing of the hands before and after the dressing. Small packages of absorbent cotton wrapped in layers of paper in an aseptic box or towel should be used, and not the cotton bales obtained from department stores, dragged about on the beds or tables.

In the presence of *dermatitis* caused by the pus, or of folliculitis of the cheek—a common accompaniment in children—a coating of the following ointment should be applied after the ear bath:

℞ Zinci oxidi,
Bismuthi subnitratrisāā 1 gram (gr. xv);
Petrolati 10 grams (ʒiiss).—M.

If suppuration is extremely copious, one or two daily *irrigations* with 1 liter of physiologic salt solution (1½ teaspoonfuls of salt in 1 liter of boiled water) or with a weak alkaline solution should be ordered.

These irrigations are to be carried out with a fountain syringe in adults and with the bulb syringe in children.

After having explained to the patient the details of technic of the dressings, the physician should **keep a watch** on the ear, the mastoid and the general condition. *Otoscopy* should be practised on alternate days in the first week, then every three or four days. Inspection of the orifice in the drum membrane will reveal the extent of drainage. The *mastoid process* should be palpated at each visit, throughout the duration of the otitis. The *temperature* should be taken regularly until the condition terminates.

If unable to exercise such a systematic, though intermittent supervision, the physician should recommend *rest in the room* for the first few days, or as long as there is fever, and an immediate call for the physician if evidences of retention appear, *vis.*, cessation of discharge and appearance of pain in the mastoid.

About the fifteenth or twentieth day, the suppuration undergoes a change, the pus becoming more fluid and mucous. Use of the hydrogen peroxide should, however, be continued until healing has taken place. The practitioner should not attempt the insufflation of powders nor the instillation of alcohol into the auditory canal, but leave these special procedures to the otologists.

If, two weeks after recovery, the hearing has not returned to normal, it will be advisable to have the ear examined by a specialist.

C.—PROPHYLACTIC TREATMENT OF SUPPURATIVE OTITIS.

The prophylaxis comprises the following indications:

1. *Prevention of chronic otitis*, in the course of acute nasopharyngeal infections, through nasal antisepsis by means of ointments or of oil instillations in children. The patient should also be enjoined to *avoid forcible blowing of the nose* in order not to infect the ear, and to avoid nasal douching.

2. If the nasal cavities and nasopharynx are the seat of *chronic infection* and the otitis drags along for five or six weeks, one of the best means of relieving it is to curet adenoid vegetations.

3. In all cases such an operation should be performed after recovery from the otitis, in order to *prevent recurrence*.

CHRONIC OTORRĤEA.

The treatment of this condition includes:

1. That applied by the *practitioner*, which is always *palliative* and sometimes curative.

2. That applied by the *otologist*, which is always *curative*.

I.—TREATMENT BY THE GENERAL PRACTITIONER.

What to Avoid.—1. *Treating the otorrhea without having examined the ear*, observed the lesions (polyps; etc.) and investigated their causes (adenoid vegetations, nasal infection), and without knowing the patient's general condition.

2. Applying *ill-considered* and old-fashioned *treatment*, i.e., one not based on definite indications; telling the patient simply to wash out his ears with fluids the formulas of which are changed every week; running through the whole list of pharmaceutic novelties, antiseptics, etc.

3. Applying treatments with the technic of which the physician is unfamiliar. He will find it stated in text-books on otology that ear baths of silver nitrate sometimes give excellent results; that cauterizations with chromic acid or zinc chloride, or the removal of polyps will sometimes dry up obstinate ear discharges. Pity the patient whose ear is bathed or cauterized in this way! Suppose his Eustachian tube is patulous; it will not be necessary to examine his throat in order to see the burn produced by the caustic . . . hearing his screams will suffice.

4. Investigating polyps or a mastoid sinus with the probe; the lateral sinus may be ruptured or the dura punctured. All these maneuvers are as reprehensible as the exploration of a wound of the chest or abdomen.

Procedures Indicated.—While the physician's treatment is not an active one, he may at least make useful recommendations. Two possibilities may be recognized: 1. Simple otorrhea. 2. Otorrhea with complications.

A. Simple Otorrhea.—This means an ear discharge without causal lesions in the nasal cavities or pharynx and without ear polyps. The patient should be frankly told: 1. That his deafness is due to suppuration and that the latter must be treated, without a definite promise of results to be obtained as regards the hearing. 2. That the treatment may take a long time and that the discharge, dating back a number of years, will not dry up under a few antiseptic instillations.

Disinfection of the ear should be proceeded with by the following means:

1. The *patient* is required to carry out *instillations* of full strength *hydrogen peroxide* solution into the ear morning and evening. The solution should be retained for two minutes; then the fluid, after having foamed freely and brought up the pus from the depths toward the meatus, is dried

out with cotton. The instillation should be repeated three or four times in ten minutes.

Ether may be substituted for the peroxide solution.

2. The *physician*, once or twice a week, should first of all make sure that the treatment is being carried out properly by having the patient go through an instillation in his presence; then he should himself apply the following treatment: (a) An ear bath with hydrogen peroxide solution, or an irrigation if suppuration is abundant, followed by very careful *drying* with cotton on an applicator; (b) an instillation of one of the following liquids:

℞ Alibour's fluid	6 c.c. (f5iss);
Aquæ	12 c.c. (f3ij).—M.
℞ Alcoholis	48 c.c. (f3iss);
Acidi borici	8 grams (3ij).—M.

The *ear baths of boric acid in alcohol*, repeated two or three times a day, are often followed by gratifying results. The pharmacist should be directed not to filter the preparation and the patient to shake the bottle vigorously before use. After the ear bath, which is to be continued for five minutes, the alcohol is allowed to run out from the ear, the excess of boric acid remaining as a coating over the bottom of the perforation. In some instances this solution causes pain. Methylene blue in a 0.2 per cent. solution, instilled, acts well as a deodorant and exerts a favorable effect on the suppuration. *Dakin's solution*, 10 per cent., however, seems to give the best results of all in fetid, chronic ear discharges, and is the solution to which I give preference, using it for instillations twice daily.

If recovery takes place, a *prophylactic* treatment consisting in avoidance of the introduction of water in the ear and of cold baths and sea bathing should be prescribed, and the ear examined once or twice yearly for three or four years.

The *minor complications* of chronic otorrhea (impetigo, eczema of the meatus) are to be treated as described in the section on eczema.

If, after several weeks of the above treatment, suppuration *obstinately persists*, the advice of a specialist should be sought.

B. Otorrhea with Complications.—The patient should be gone over with an otologist, who, by reason of his thorough technic, will be able to decide upon the course to be followed. Possibly the practitioner will not be able to carry out the necessary treatment himself, but it will be well for him to know what the treatment properly should be.

II.—TREATMENT BY THE OTOLOGIST.

Proceeding from the simple to the more complex, here is what the specialist will do:

1. He will treat the *causal disorder*, *e.g.*, the *nose* (removal of adenoids or of the tonsils), nasal suppurative conditions or *ozena*, and the *general condition* (anemia, *scrofula*) with tonics, out of door life, a stay at the seaside, etc.

2. He will destroy *fungoid growths* by cauterizations with zinc chloride, silver nitrate or chromic acid, or remove *polyps* that keep up the suppurative process.

3. He will administer systematic *local treatments* to facilitate evacua-

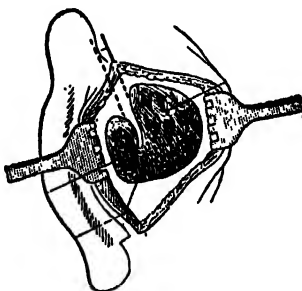


Fig. 358.—Mastoid operation.

The procedure consists in opening of the mastoid together with resection of the posterior wall of the auditory canal and removal of the ossicles. The canal, tympanum and mastoid cavity are thus merged into a single cavity, all of the walls of which are carefully cureted and which heals by epidermization.

tion of pus, disinfect the tympanum and dry up the suppuration, employing for the purpose irrigations of the attic, dry treatments with boric acid, the insufflation of powders, plugging of the auditory canal with wicks of aseptic or zinc peroxide gauze, and any other serviceable procedures.

4. Lastly, he will recommend **surgical treatment** if there is bone disease—*ossiculectomy* in the first place, followed by curettage of the tympanum. In the event of failure, the *mastoid operation* will be definitely indicated, especially if attacks of acute mastoiditis have been superimposed upon the chronic otorrhea.

OTITIS SCLEROTICA SECONDARY TO CHRONIC CATARRHAL OTITIS MEDIA.

What to Avoid.—1. Treating the ear with the Politzer bag, by massage of the drumhead, performing catheterizations, using electricity, etc., while neglecting the underlying cause (rhinitis, disturbances of general health). 2. Recommending *operations*. Plicotomy, synechotomy, ossiculectomy, etc., have all been tried without success.

Procedures Indicated.—1. *Removal of the cause* of the catarrhal otitis by *treatment of the nose and nasopharynx* (chronic coryza, deviated septum, adenoid vegetations). This is a measure of prime importance.

2. Next, *treatment of the diseased ear*. This indication is met by re-establishing the patency of the Eustachian tube and injecting air into the middle ear. The otologist should make the decision regarding the indications for the *air douche* and *catheterization of the Eustachian tube*.

3. *Medical treatment*, consisting of measures to oppose the general diathetic state, a suitable diet, interdiction of all toxic factors such as alcohol, tobacco and overwork, and also of life at the seashore if it induces congestive disturbances and increases the deafness and tinnitus.

4. The use of an *acoustic device*, such as a horn, of which many forms are available. Unfortunately, the patient cannot be told to use such and such an instrument as the oculist directs his myopic patient to wear glasses of definitely prescribed strength. There is no unit of measurement in this connection. The patient may select his instrument himself, choosing the one with which he hears best without fatigue of the ear.

PRIMARY OTITIS SCLEROTICA.

The patients are young subjects, principally young girls or women between the ages of twenty and thirty, afflicted with this *juvenile* variety of sclerotic otitis.

In this condition the nasal cavities and pharynx are normal, as are likewise the middle ear, tympanum and ossicles. The pathologic lesion consists of an osteitis of the internal ear with *ankylosis of the stapes* and changes in the membranous labyrinth. One is dealing with a trophic disorder constituting the local expression of an arthritic, gouty general condition in which heredity plays an important part.

The *symptoms* are almost the same as in the first variety of otosclerosis, but present the further disadvantage that pregnancy and lactation

increase the deafness. Peter's dictum applied to heart cases: "If a girl, no marriage; if a woman, no pregnancy; if a mother, no lactation," is also applicable to the young female patients with otosclerosis. Its practical execution is, however, impossible, except as regards lactation.

The *treatment of the ear* itself is of a *negative* nature. Above all,

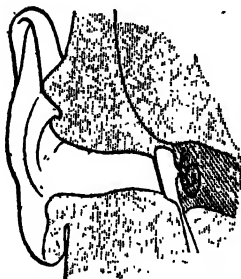
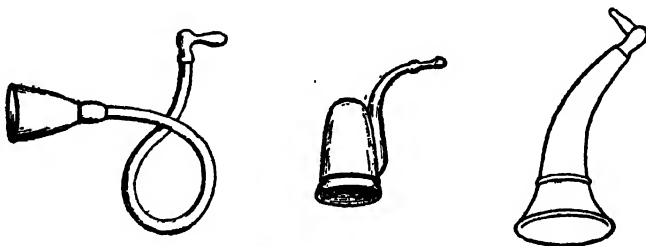


Fig. 359.—*Primary otitis sclerotica of the internal ear with ankylosis of the stapes. The Eustachian tube and drum are free of disease.*

recommendation of local treatment of the ear, as by catheterization of the Eustachian tubes, air douches and massage, should be avoided, as the tympanum is normal and the symptoms would be made worse.



Figs. 360 to 362.—Acoustic horns.

The treatment is palliative and is directed toward the general condition of the patient: A strict diet; potassium iodide; overwork and fatigue to be avoided; tepid hydrotherapeutic measures and massage; if need be, a vegetarian diet; intestinal derivative agents.

For the deafness, the use of acoustic devices, *horns* or *microphones*, lip reading, and reeducation by acoustic exercises should be recommended.

The *microphones* are serviceable devices which are light in weight and readily concealed, and often materially assist the hearing.

Lip reading is to be recommended. This form of training of the ears and eyes yields results which sometimes make up for the deficiency of the unfortunate deaf persons in a surprising manner. A special instructor is necessary for the purpose. It is even preferable to take lessons from several instructors, in order that the deaf person may become accustomed to hearing different voices and reading on different faces—a principle followed, indeed, with the greatest success in certain schools for the study of foreign languages.

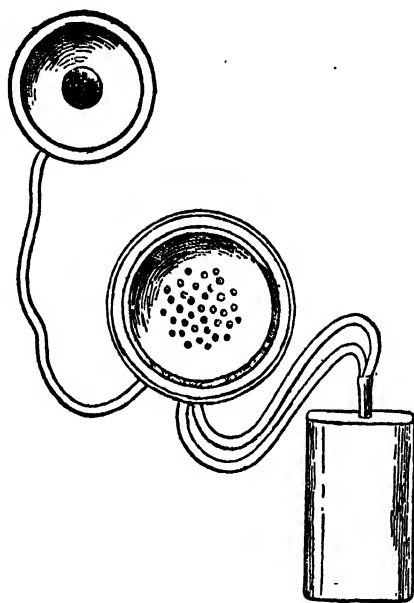


Fig. 363.—Microtelephonic apparatus consisting of a small dry cell and transmitting and receiving devices.

Reeducation by acoustic exercises is also advisable, *e.g.*, by the oral method of Urbantschitsch or that of Tillot. This proceeding takes considerable time and requires a special instructor. *Auricular gymnastics*, *i.e.*, systematic exercises of the muscles of the auricle, external auditory meatus and Eustachian tubes, and, through the intermediation of these muscle groups, of the muscles of the tympanum, has been recommended by Fernet.

On the whole, the scientific and otologic treatment of deafness has remained almost without result. One cannot be surprised, therefore, at the number of laboratories and schools of a quackish character which arise from time to time, proclaim the conquest of deaf-

ness, and go out of existence soon after. The failure of medical science is, unfortunately, often the foundation of charlatanry, and the practitioner should always remind his deaf patients that too much care cannot be exercised in shunning widely advertised schemes which merely empty the pockets of the sufferers without making any due return.



Fig. 364.—The dry cell is hidden in one of the patient's pockets; the transmitter is fastened to the waistcoat or bodice, and the receiver, brought in contact with the ear, opposite the external auditory meatus.

For tinnitus, the bromides, hydrotherapeutic procedures, supervision of the patient's general health, and high frequency treatment may be recommended.

DISEASES OF THE EYE.

By A. TERSON, M.D.

Certainly in the case of no other special sense organ is the treatment more specialized than it is in the disorders, spontaneous or traumatic, of the eyeball. While the ocular adnexa (lids, lacrymal tract, conjunctival sac and orbit, with the cellulo-adipose tissue in the latter, traversed by so many transmitting structures) are naturally less specialized in their pathology than the eyeball—and consequently likewise in their therapeutics,—it is nevertheless a fact that their disturbances nearly always react upon the eye itself and that their treatment, although less distinct, demands, if serious harm to the eye is to be avoided, or not directly induced, a degree of experience and skill that cannot be built up on short notice. None can fail to realize how true this is, alike in surgical operations on the eye and in the local application, however indispensable and sovereign in its results, of active topical agents to these delicate organs.

Shall it be said that the unspecialized physician—for whom these lines are written—cannot apply beneficent treatment, not only in emergency cases, which will always be compelling him to see, *first and alone*, the diseased or wounded eye, but also in the subacute or slowly progressive and no less serious cases, in which, while he cannot know nor do all things, he must nevertheless, here as elsewhere, be useful, avoid doing harm, and work in mutually loyal co-operation with the ophthalmologist?

After over thirty years of practice, I am convinced that, at the present time at least, the part played by the unspecialized practitioner is an effective and definite one.

The striking advances made in asepsis and local anesthesia, the diffusion of many kinds of knowledge, and even the unparalleled [war] period which compelled medical men to examine, understand and act in all the special fields of medicine, generally by their own unaided efforts—all this permits of our speaking differently than in times in which the ophthalmologists, few in number, kept themselves and their branch of medical science too jealously aloof.

At the present time, without losing any of the advantages of their personal knowledge and experience, or of the process of training they have gone through, *which nothing can replace*, they likewise benefit very extensively themselves from the newer resources of *general* therapeutics,

and when they address themselves, as I am now doing, to their non-specialized colleagues, they can say to them: "We cannot teach you nor recommend to you from A to Z a branch of therapeutics which is and will remain an extremely delicate one, but we shall point out to you in as concise and simple a manner as possible the course which you should follow, whether it be an active or negative one, alike in the interests of the patient and your own. We shall make a statement of what you can yourself accomplish, especially if you know how to be patient and cautious."

Thus, where the presence of glaucoma has been detected, the physician should not attempt, contrary to the recommendations made in text-books on emergency surgery, to operate at once; if this were done, the eye would ordinarily be sacrificed. If he at once prescribes instillations of pilocarpine at *very* short intervals, and if he seconds the effects of these instillations by other medical means, the eye will be placed *by him* in an excellent condition for an early operation, soon to be carried out at the opportune time. And what is thus said concerning operation on a glaucomatous eye applies likewise to a simple lacrymal catheterization, which in inexperienced hands has, not to mention the aggravating false passages, more than once led to an abscess of the orbit—just as a simple injection into the lacrymal passages, which did not *seem* to be a dangerous procedure, has more than once resulted in death.

My purpose herein will be, therefore, to set forth for a practitioner who has never made a study of eye diseases, the procedures he can apply for the cure or betterment of eye disorders from which he cannot conscientiously turn aside at the start.

In disorders not of this category he should avoid substituting himself, to the detriment of all concerned, for the specialist, whose treatment he may, however, later continue, once the case has been directed along sound lines.

In Martinet's "*Clinical Diagnosis*" I have already considered the diagnosis and symptomatology of eye diseases and the general procedure in elementary office examination of the eye. The reader will constantly have occasion to turn to refer to these earlier sections; Diagnosis and treatment are indissoluble.

In the present section I shall endeavor to prepare the practitioner for the treatment of common eye disorders, mention the equipment necessary and sufficient for the purpose, and explain the manner in which he will have to depart from *medical* therapeutics—*his* therapeutics—in order to adapt the treatment to the requirements of a localization of a general disturbance in the eye.

A summary of the knowledge he should possess of the medical and surgical treatment of *regional* diseases of the eye and its adnexa will then be given. This treatment is of a far more conservative nature than it was formerly: Many disastrous conditions can now be avoided which formerly led to irreparable lesions, blindness and sometimes enucleation of the eye, in some instances after the patient had gone through distressing and useless operations.

In order that the reader may have a conception of both the good and the harm he may do, the *prognosis* will not be considered independently of the treatment; in fact, these two essential features of the matter—the only two definitely required by the patient—will be brought together, and allusion will be made to *prophylactic* measures, often valuable in preserving from damage the fellow eye of the patient or the eyes of his associates.

This presentation, intended to be free of all bias and mental reservations, will by no means be directed toward exclusively medical or surgical treatment. All of us know that many eyes are lost where recourse is not had *in time to operation*, which nothing can obviate or postpone when it is really the only rational, radical and sound treatment.

I.—PREPARATION FOR TREATMENT.

INDISPENSABLE EQUIPMENT.—Instruments.—In addition to the ordinary instruments for general surgery, which are often applicable to the adnexa of the eye (tenaculum forceps, hemostats, needle-holders, etc.) if they are of small size, the practitioner should possess a few ophthalmologic instruments, of which some have been alluded to and illustrated in the work on *Diagnosis*, in the sections on the examination and symptomatology of the eye. He should procure, therefore:

Two lid elevators.

One blepharostat (eye speculum—author's model, which can be removed instantly and is applied at each angle of the palpebral fissure).

Cilium forceps.

A pair of small *curved* scissors, *very fine* and *narrow-pointed*.

A lance-shaped needle for the removal of *fixed* foreign bodies.

A *blunt* curet, to "pick up" *movable* foreign bodies.

Forceps to fix the eyeball (*demand round-angled jaws*).

Hemostatic lid forceps (Desmarres model).

A very small, very sharp curet.

Hooked forceps, likewise very small, for small tumors.

Practitioners who have already *witnessed and carried out* UNDER EXPERT GUIDANCE lacrymal catheterization should also have:

A conical lacrymal dilator.

Weber's canaliculus knife.

About ten *olivary* and *curved* lacrymal probes: Two No. 2 probes, five No. 3 (most used), and three No. 4.

An all-glass syringe of 2 cubic centimeter capacity, provided with an *olivary* nozzle. (Anel's metallic syringe and *pointed* nozzles, which make false passages, should be *absolutely* avoided).

A fine metallic point and an olive, mounted on a handle and which can be heated without damage, can easily be substituted for the galvanocautery or thermocautery in the treatment of the eyes and lids.

For *suturing* the ophthalmologist uses, according to the case, silk, chromicized catgut or reindeer tendon in very fine *absorbable* strands (A. Terson). The practitioner may content himself with *fine black* silk (readily visible over raw surfaces), Nos. 00 and 000; these may be had already threaded in curved needles, in sterile tubes.

Topical Agents.—These are generally supplied in ampoules, tubes or sterile drop bottles.

Cocaine hydrochloride, $3\frac{1}{3}$ per cent. (for instillation).

Ampoules of procaine (novocaine) 2 and 4 per cent., with adrenalin, already in use for injection into the tissues in general surgery and dentistry.

Pilocarpine nitrate, 1 per cent.

Atropine sulphate, 0.5 per cent.

A vial of powdered ethylmorphine hydrochloride (dionin).

A tube of weak "yellow ointment," *c.g.*:

℞ Hydrargyri oxidi flavi	0.15	gram	(gr. iiss);
Adipis lanæ hydrosi	1	gram	(gr. xv);
Petrolati	9	grams	(gr. cxxxv).—M.

(The yellow oxide should be prepared by the wet process, washed and triturated).

A tube of black ointment of argyrol or collargol:

℞ Argyrol vel Collargol,			
Adipis lanæ hydrosi	1	gram	(gr. xv);
Petrolati	9	grams	(gr. cxxxv).—M.

A black drop bottle containing:

℞ Argenti nitratis	0.15	gram	(gr. iiss);
Aquæ destillatæ	15	c.c.	(f℥ss).—S.

Sterilized metal boxes containing rings of cotton and of gauze, towels, etc.

Bandages of thick crepe (5 and 7 centimeters—2 and 3 inches—broad).

Oval and loose eye-shields (scapular form) of black fabric or felt.

If the practitioner administers *subpalpebral injections*, the syringe, with its liability to bespatter other tissues, should be avoided, and preference given to the author's goose-neck *nozzle*, which can be introduced beneath the lids without any irritation of the cornea and yields a broad, deep jet, washing out the cul-de-sac—a nidus for bacteria.

Provided with the above equipment and the armamentarium already in use in his everyday practice, the physician is enabled to act without delay in these cases. Other requirements may be prescribed, purchased or modified on occasion.

ANESTHESIA AND ANALGESIA OF THE EYE.—*General* ANESTHESIA now has but rare indications in ocular surgery (children, extensive operations on the orbit, etc.). *Local* anesthesia is sufficient for nearly all purposes, and is instituted either by *instillations* (cocaine hydrochloride, $3\frac{1}{3}$ or 5 per cent. as the maximum strength), by *subconjunctival* and *periocular injections*, or by *subcutaneous injection*. In interstitial injections, solutions of cocaine used should not exceed 1 per cent. in strength; or preference may be given to solutions of the type of 4 per cent. procaine (novocaine) with adrenalin, which permit of carrying out the most painful operations (enucleation, etc.) except in rare instances.

ANALGESIA comprises the use of general agents (opium and opiates, the ordinary analgesics, etc.), combined with the causal and operative treatment and local measures such as *very* hot applications, rarely cold applications, withdrawal of blood by leeching or wet cupping, and the application in the eye of powdered ethylmorphine hydrochloride (dionin), which, after having induced severe irritation with intense hyperemia and chemosis, often affords a degree of analgesia otherwise unobtainable and sometimes avoids the necessity of removal of eyes not previously tolerated.

ANTISEPSIS AND ASEPSIS.—Asepsis of the *hands* is imperative, as in general surgery. The instruments, tampons and dressings used should always be *sterile*, and a supply of such articles should be kept in reserve in portable boxes for use in emergency cases.

In the antiseptics of the eye, irrigations with strong antiseptics should be avoided, *especially mercury bichloride*, which may lead to corneal opacities. Preference over boric acid solution should be given to *alkaline* solutions of sodium borate and bicarbonate, or to boiled water or physiologic salt solution used in affusions with cotton pledgets, in the eye-cup, or sometimes by *subpalpebral* irrigations with the author's broad, smooth nozzle and a receptacle or funnel at an elevation of only 30 centimeters (12

inches), without ever exceeding 250 to 300 cubic centimeters (8 to 10 fluidounces) at a sitting. Pointed syringes, with their liability to produce injuries and scatter infectious material, should be absolutely avoided.

DRESSINGS AND BANDAGES.—The *occlusive* dressing, which at first sight would seem always indicated, is often unnecessary and sometimes detrimental. The latter is the case where the eye is *suppurating* (conjunctivitis, dacryocystitis, etc.), and where it is *hard* (glaucoma) or very *irritable* (some cases of iritis). In fact, a bandage over the eye should never be compressive, but merely contentive and not resting on the eye; its effect should be limited to supporting the eyelids, which constitute the natural dressing for the eye.

In many instances a non-compressive type of dressing (U-shaped or scapular form) should be preferred; or else, *spectacles* which keep the eye in a warm, closed cavity (automobile and aviation goggles), or *smoked glasses*; shell-shaped and with or without a lining of muslin or cotton.

The dressing should generally be a *dry* one (a round dressing of aseptic gauze, padded with cotton and sometimes coated with collodion), except in cases of ocular and periocular suppuration, in which the *wet* dressing, continuously renewed and with or without *oiled silk*, is best.

In some few cases (facial paralysis, etc.), strips of zinc oxide plaster are used to keep the lids together.

The occlusive dressing of gauze and cotton should be fastened on either with a triangular piece of cloth with attached straps, or, more commonly, with a band of thick crepe 5 centimeters (2 inches) wide, enclosing one or both eyes. (Tarlatan and all stiff or rubberized materials should be avoided.) The binocular dressing, when acceptable, is very useful *even if but one eye is involved*, tending to hasten recovery of the affected eye by resting its fellow.

REMARKS ON COLLYRIUMS FOR ORDINARY USE.—A few formulas will be sufficient in the treatment applied by the practitioner—complete in mild cases and only preliminary in severe cases.

Avoiding drug incompatibilities and polypharmaceutic mixtures, and preferring alternation of agents and the use of mild remedies and repeated applications to the strong remedies too often recommended in formularies, he may confine his prescriptions to a few collyriums.

Not over 15 cubic centimeters ($\frac{1}{2}$ fluidounce) of the menstruum (boiled distilled water, sterile or camphor water) should be used. Rose water, cherry-laurel water and other popular preparations which are nearly always contaminated should be avoided; at a pinch,

irrigations with weak tannic infusions (tea, English walnut leaves, etc.) may be employed.

For *instillations*, use should be made of cocaine hydrochloride (2 to 5 per cent.) or atropine sulphate (0.5 per cent.), bearing in mind the fact that a drop of atropine interferes with *near* vision for *about ten days*, and that the same drug, which has been much abused, causes eventually a special form of conjunctivitis which necessitates discontinuance of its use and the employment of substitutes, the best of which is *euphthalmin* (4 per cent.). Pilocarpine hydrochloride or nitrate (1 per cent.) may also be prescribed on occasion. The ordering of physostigmine (*eserine*) should be left to the ophthalmologist, for even in an oily collyrium this is a painful myotic and one which demands supervision.

Upon instillation, the action of procaine (novocaine) is much inferior to that of cocaine.

Adrenalin may be combined with cocaine and procaine in collyriums and injections. Like cocaine, it should not be abused of in lesions of the *cornea*, which these agents make worse (exfoliation) and in which they hinder the reparative process by their *ischemic* and vasoconstrictor action.

On the other hand, certain *congesting* and vasodilator collyriums (ethylmorphine hydrochloride or dionin) favor such repair. *Daily* instillations of dionin should, however, be avoided; it is an excellent agent when used only *two or three times a week*, but a very harmful one if used several times a day.

As an antiseptic, *silver nitrate* retains an outstanding position, provided it is not used in excessive concentrations, such as have now been abandoned. The stick, and even the mitigated stick, should NEVER be used on the conjunctiva, lest disastrous corneal complications ensue. The practitioner should limit himself to 1 per cent. or sometimes 2 per cent. solutions (the latter to be neutralized with salt solution) obtained from a *black* bottle or colored ampoules.

The use of these solutions should be seconded by a collyrium of colloid silver, the best of which is strong *argyrol* (10 to 20 per cent.); this must be instilled several times a day and not continued too long, lest an indelible argyrosis of the conjunctiva result.

Zinc sulphate (0.05 gram— $\frac{3}{4}$ grain—in distilled water, 10 to 15 cubic centimeters— $\frac{1}{3}$ to $\frac{1}{2}$ fluidounce) remains the ordinary collyrium for conjunctivitis with but little secretion. It must not be used indiscriminately and without due reason, for it aggravates many corneal and other disorders and leads to a loss of valuable time, as one may see it prescribed in iritis (!), glaucoma (!!) and other serious intraocular conditions.

I shall not dwell on the other collyriums which the specialist will use when they are indicated (copper sulphate, mercury salts, alum, etc.). Mercury bichloride should be avoided for irrigations (corneal complications) and especially lead subacetate, an old remedy which is wholly useless and sometimes VERY DANGEROUS, and which, on an injured or ulcerated cornea, may instantly produce white incrustations that are practically indelible.

For *ointments*, the menstruum of choice is a *little* lanolin (anhydrous, favoring adhesion to the mucous membranes) combined with much petrolatum (*e.g.*, 1 or 2 parts of the former to 8 or 10 parts of the latter). Ointments should be applied with an olive-tipped probe passed through a flame or a boiled ear-pick; a piece of the size of a grain of wheat should be placed in the lower conjunctival cul-de-sac once or twice a day.

Powders, such as calomel, dionin, etc., should be prescribed and used only by the specialist.

CONCOMITANT GENERAL TREATMENT.

I need not here go into a discussion of the general treatment, which has already been freely considered in earlier sections of the work, and in respect of which the physician is brought back to his own field. Such treatment should, however, be *continuously* availed of in the curative and preventive management of ocular disorders, however "local" they may seem.

The *complete* treatment of an eye disorder should be based on a combination of local and general treatment with suitable *hygienic* measures, likewise both local and general.

II.—INJURIES OF THE EYE AND ITS ADNEXA.

Even if the eye has not been perforated, even if distant and near (reading) vision in it is good, the practitioner should, in the majority of instances, refrain from giving an absolute prognosis, for some slight traumatisms, and even contusions which the patient has difficulty in recollecting, are attended with remote consequences.

TRAUMATIC CONDITIONS.

I. Where no Wound Exists.—*Contusion without Perforation.*—This is frequently associated with palpebral and subconjunctival ecchymoses as well as one of a number of intraocular lesions (hypoema, dislocation of the lens, etc.). Treatment should be limited to a dry,

loose dressing; an investigation of the condition of the fundus and of vision should then be advised. No collyrium should be used beforehand, and especially no atropine "on general principles," as it predisposes to glaucoma.

Prepalpebral Dislocation.—The eye is in a situation resembling *paraphimosis*. The eyeball should be cocainized and petrolatum applied over it. An injection of 2 per cent. procaine or 1 per cent. cocaine in the temporal region (Van Lint, Villard), on the course of the fibers of the facial which supply the orbicularis palpebrarum, will relax this sphincter muscle and facilitate the reduction. If necessary, section of the *external* palpebral commissure should be carried out to permit of returning the eye to its normal position. Vertical strips of zinc oxide adhesive plaster and a dry retentive dressing should be applied.

II. Where a Palpebral Wound Exists.—The physician should ascertain whether the wound involves the orbit and the eyeball. Anesthesia should be instituted and relaxation procured by instillation of cocaine and deep injections of 2 per cent. procaine along the course of the sensory and motor nerves. An *emergency suture of the lid* should be performed with *very fine* black silk, the different layers being sutured separately, and excisions and liberating incisions made as required to secure accurate approximation. *Delayed* suturing often leaves scars with a disfiguring incurvation of the lid margin. Before any suturing is done, the wound should be disinfected. Pure tincture of iodine should be avoided, as it is dangerous for the eye; it should be much diluted and the eye protected with a coating of sterile petrolatum and a moist disk of cotton. A search should be made for any *deep-lying* foreign body in the lids and orbit; such a foreign body may be extracted with a strong, rather pointed hemostat of the Kocher type. An X-ray study should be made in the event of sinus formation (*overlooked* foreign body). A thorough examination of the condition of the eye should be recommended.

III. Burns of the Lids, Conjunctiva and Cornea.—The *prognosis should be guarded*. It is *paradoxical*, for some burns present a mild appearance on the first few days (burns by ammonia, etc.) and yet later may be most unfortunately complicated by a destructive *necrosis*, oculopalpebral adhesions (*symblepharon*) and perforations of the eye.

The *least serious* burns are those caused by *metal* (curling iron, etc.); the most serious, those caused by corrosive fluids and sometimes by explosions with countless foreign bodies in the cornea.

In the *emergency treatment* of burns by acids, the parts should be flushed with an alkaline solution (sodium bicarbonate solution, Vichy water, etc.) or with plain water, and in burns by alkalies (ammonia, caustic potash, etc.), with an acid (lemon juice, etc.). For lime burns,

the use of sugar in water (forming an insoluble saccharate), of milk, of egg albumin, etc., has been suggested. In truth, the physician is almost never called early enough to apply these at least *theoretically* useful measures. Irrigations with boiled water, and a fatty and moist dressing, such as boiled rings of cotton, with application of petrolatum, sterilized if possible, are serviceable. (Boric petrolatum should never be used, as the crystals of acid are irritating). Lime liniment should be avoided on account of contamination. Preference should be given to a sterilized oily collyrium containing 1 per cent. of procaine. As a sterilized ointment the following should be applied twice daily:

R. Zinci peroxidi	0.1 gram	(gr. iss);
Adipis lanæ hydrosi	1 gram	(gr. xv);
Petrolati	9 grams	(gr. cxxxv).—M.

Strict asepsis is necessary. A dry dressing may be used as soon as the discharge is reduced to a small amount.

Foreign Bodies.—1. **Beneath the Lids.**—These are sometimes overlooked, even though quite large, when located in the *superior* conjunctival cul-de-sac. A *complete* inspection of the superior cul-de-sac should be made with my special propulsor (see "CLINICAL DIAGNOSIS").

2. **On the Eyeball.**—The foreign body should be removed, after *careful cocaineization*, with a lance-shaped needle or an ordinary needle.

3. **In the Eyeball.**—This condition may result, for example, from The lids should be washed with soap and boiled water, tincture of accidents while hunting, occupational accidents, war injuries, etc. iodine applied to the skin wounds, a dry, aseptic dressing fastened on firmly (collodion or strips of zinc oxide adhesive, with the band sewed), and the patient sent *at once* to the ophthalmologist.

Wounds of the Eyeball.—Whether these appear relatively simple or serious, they require the *exclusive and emergency* care of the ophthalmologist, nowadays always accessible within a reasonable distance. The practitioner should limit himself, after cleansing (with soap, boiled water, saline solution, mercury cyanide, etc.), to applying an aseptic dressing, held securely by collodion or adhesive strips, after aseptic lavage with warm sterile water, and avoiding all undue pressure on the tissues. Indiscriminate application of atropine, cocaine, adrenalin, etc., which promote complications, must be absolutely avoided. No wash, collyrium or ointment that has not been sterilized should *ever* be brought in contact with an eye wound. Lead subacetate solution is to be shunned. Even the emergency operations on the eye (excision of prolapsed iris, trimming and suture of the wound, cauterization of infected wounds, etc.) should be left to the ophthalmologist, and temporizing by the practitioner is to be avoided. He must secure

immediate information from the specialist regarding the actual damage done, the diagnosis of intraocular foreign bodies, the prognosis and the treatment.

He should beware of erosions (as by contact with wheat in a field, etc.), even slight, in an individual already suffering from *purulent dacryocystitis*, *ozena*, etc. (pressure should in *all* cases be made over the lacrymal sac to determine its contents). Such erosions become infected very quickly and, in the absence of abortive treatment, rapidly lead to suppurative panophthalmitis. The patient should be sent to the specialist as an emergency case.

Again, if, a few weeks after a wound of one eye, the *other eye* becomes hyperemic, waters and shows progressive reduction of vision, the possibility of *sympathetic ophthalmia* should be thought of—an insidious disease, frequently leading to blindness, and which *nearly* always calls for immediate enucleation of the injured eye if vision in it is already permanently lost; the operation is supplemented or sometimes replaced by intensive internal treatment.

Suppurative Panophthalmitis.—When the infection has reached the deep membranes and the vitreous body, transformed into a yellowish mass like the yolk of a boiled egg, the ophthalmologist proceeds with an operation consisting of *evisceration* (curettage) of the eye, the sclerotic being retained to form a firm, movable stump. Rarely he will limit his procedure to deep cauterization directly in the vitreous body. In this condition enucleation is avoided, as it is at times followed by meningitis—exclusively in this type of case—and would, without any good reason, therefore, deprive the patient of an excellent stump for a deceptive artificial eye.

III.—REGIONAL AFFECTIONS OF THE EYE.

DISEASES OF THE CONJUNCTIVA.

Spontaneous Ecchymoses.—Massage of the eye and hot applications are indicated; likewise treatment of the general condition, which varies greatly (whooping-cough and other diseases with paroxysmal cough; arteriosclerosis, in which conjunctival ecchymosis sometimes precedes cerebral hemorrhage, etc.).

Acute Congestive Edema.—Avoid irritating collyriums. Merely use hot sodium borate lotions, with gentle massage.

Catarrhal Forms of Conjunctivitis.—1. **Acute.**—MEASURES INDICATED: Cleanse the eyes four or five times a day with tampons dipped in a warm antiseptic solution (boiled water, weak boric acid solution, or

better, an alkaline solution containing sodium borate, sodium bicarbonate and sodium salicylate).

Argyrol, 20 per cent., should be instilled two or three times a day; *silver nitrate*, 1 per cent., once a day.

On retiring, *after* the lavage and instillation, the lashes should be anointed with the following:

R Zinci peroxidi	0.1 gram	(gr. iss);
Adipis lanæ hydrosi	1 gram	(gr. xv);
Petrolati	9 grams	(gr. cxxxv).—M.

MEASURES TO BE AVOIDED:

Very hot lotions and, generally, bathing with the eye-cup, which is more irritating to the cornea than ordinary washing.

Astringents (zinc sulphate, etc.), which are insufficient, and mercurial ointments, which are irritating (especially the yellow oxide ointment).

Caustic remedies in high concentration (silver nitrate in 2 per cent. or 1:75 solution, copper sulphate), *unless* the conjunctivitis is *obstinate*; then, one sharp treatment, and sometimes only the one, will break down all resistance on the part of the disease.

Coverings. Preference should be given to smoked glasses, eye-shades, or loose dressings, which permit of winking the lids and of a continuous outflow of the mucous discharge.

2. Subacute or Chronic, with Little Discharge.—Here the other agents will give better results, *e.g.*, the following collyrium:

R Procainæ hydrochloridi,	
Zinci sulphatis	āā 0.05-0.15 gram (gr. ¾-iiss);
Aquæ destillatæ	15 c.c. (f3ss).

S. Sig.: To be instilled once or twice a day.

The ophthalmologist will conclude with the use of alum, silver nitrate, copper sulphate, etc., the treatment of *refractory* cases of conjunctivitis, will probe the lacrymal passages in the presence of a stricture (*often unilateral*, like the conjunctivitis), and prescribe suitable local hygienic measures (yellow-glasses for exposure to electric light, protection against dust and irritant gases, avoidance of night work).

The practitioner should keep a watch over the general hygiene as indicated by constitutional disturbances, toxic states, *constipation*, rhinitis and skin disorders. He should be familiar with the fact that iodides, atropine and various other drugs induce conjunctivitis, which disappears as soon as they are stopped.

Pseudomembranous Conjunctivitis.—In some scrofulous subjects, the exacerbations of pustular (phlyctenular) conjunctivitis are accompanied by *non-adherent* pseudo-membranous exudates. The treatment of

pustular conjunctivitis (*q.v.*) is sufficient to dispel them. In cases of conjunctivitis with *adherent* pseudo-membranes of the same type as the membranes in the throat (diphtheritic conjunctivitis), serum should be administered at once, without waiting for the results of a culture.

Locally, escharotics (silver nitrate, copper sulphate) should be avoided, and the treatment limited to instillations of saline solution, of 20 per cent. argyrol, or a 1 per cent. zinc peroxide ointment. Hot sodium borate lotions are indicated. The pseudo-membranes should not be pulled off. Moist compresses should be continuously applied.

Purulent Conjunctivitis.—I. Ophthalmia Neonatorum.

A. MEASURES TO BE APPLIED BEFORE THERE IS ANY CORNEAL LESION :

1. Cleansing with **cold boiled water** (no ice), *every hour in the day and every two hours at night* with cotton pledgets.

2. Affusions for five minutes, morning and evening (*e.g.*, about noon and 6 p.m.), with a 1:1000 solution of **potassium permanganate** diluted one-half with warm boiled water.

3. *Copious* instillations of 20 per cent. **argyrol** (fresh and prepared in the cold) in the morning, about 10 a.m., and in the afternoon, about 2 and 4 p.m.

4. *Copious* instillations, from a *separate dropper* (not to be washed, in order to avoid precipitation of the nitrate), *twice a day*, early in the morning and in the evening, of 1 per cent. **silver nitrate**, three or four drops at a time. The eye should not be touched with the dropper, the residue in the dropper should not be dropped back into the bottle, and care should be taken to see that the solution is clear. Brown dropper bottles are to be preferred.

5. In the *night*, *at least* two instillations of 20 per cent. argyrol.

This combined treatment, properly carried out, is practically always successful if applied before there is any corneal involvement. In the *refractory* cases, *one* of the daily instillations of silver nitrate may be made with a 1:75 or even 2 per cent. solution, to be neutralized with saline solution.

Argyrol, used *alone*, may be successful, but under these conditions it is recommended that the somewhat inconvenient instillations of this dark fluid be kept up ceaselessly day and night *every two hours*. Silver nitrate in 1 per cent., 1:75, or 2 per cent. solution, according to the degree of suppuration and virulence, used twice a day, permits of cutting down the number of instillations of argyrol to three or four in the daytime and two or three at night. This combined treatment is the most certain to give results.

When the child begins to open his eyes, recovery is under way, but care should be taken not to stop the treatment. It may be reduced,

if the secretion is really very scanty, to one instillation of silver nitrate, three or four instillations of argyrol and one permanganate lavage a day.

B. THE CHILD IS BROUGHT WITH THE CORNEA ULCERATED.—The whole damage will be reduced to an insignificant white spot on the cornea, if the required treatment is applied. There should be an immediate consultation with the specialist—as also in the next type of case.

C. THE CHILD IS BROUGHT WITH THE CORNEA PERFORATED.—Pro-lapse of the iris has occurred. But the eye is not lost, and there should be no undue alarm.

The entire silver treatment should be continued, and myotic ointments (1 per cent. pilocarpine) added to it; this assists the iris in gradually passing in again while the ulcer is healing.

MEASURES TO BE AVOIDED IN ALL INSTANCES:

Ice, which is unnecessary and even harmful.

Silver nitrate in *solid* form (the stick is *very* dangerous) or in *unduly strong* solutions (5 per cent. or $3\frac{1}{3}$ per cent.). It should never be *over* 2 per cent. nor *less than* 1 per cent.

The physician should not conceive the thought that under continuous irrigation, aseptic or other, the disease would pass off without corneal ulceration: Under such an insufficient treatment he would see the cornea suddenly become involved.

The treatment should not be reduced until *the child keeps his eyes open all the time*.

Bichloride irrigations are to be avoided, causing corneal opacities.

Unduly weak solutions of argyrol are to be avoided. A 20 per cent. solution should be used. Argyrol is not caustic, even in saturated solution, but it has to be instilled much oftener than silver nitrate, and the main point is to combine these two agents.

Scarifications of the mucous membrane are neither indispensable nor devoid of risk in these cases.

LITTLE GIRLS with ophthalmia originating from a purulent vulvitis should be given the same treatment as the newborn.

2. Gonorrheal Ophthalmia in the Adult.—The emergency is greater, and the treatment must be still more active. In the stage of onset, with *stiffness of the lids*, 20 per cent. argyrol should be instilled at least *every two hours, night and day* (or a 20 per cent. ointment used continuously). Then, while continuing the argyrol, there should be administered three times in the twenty-four hours a *subpalpebral irrigation* (about 200 cubic centimeters—7 fluidounces) for five minutes with the author's blunt nozzle and a 1 : 1000 solution of calcium or potassium per-

manganate, diluted with one or two parts of water, according to the sensitiveness of the patient. Two instillations of 1 per cent. silver nitrate solution in the twenty-four hours supplement this treatment of the *pre-purulent* stage. The ophthalmologist will, if necessary, use silver nitrate in a stronger solution (1:75 or 2 per cent.), washed off with salt solution, and will supervise the tedious treatment of the *purulent stage*.

The other eye should be protected with a sheet of mica, a watchglass or other transparent device, or simply with a piece of gauze to which an impervious disk is attached and collodion applied. Silver nitrate should not be instilled for *prophylactic* purposes, though argyrol might, if necessary, be thus used.

Antigonococcic serum may be injected and instilled; it does not remove the need of the foregoing treatment. *Milk injections*, at least as effective as the serum, may be tried.

Vegetative Forms of Conjunctivitis.—1. **Follicular Conjunctivitis.**—Most pronounced in the *inferior* conjunctival cul-de-sac. It should be cauterized from time to time with an alum crystal or sometimes copper sulphate. Astringent collyriums (zinc sulphate, alum, aluminated copper, etc.) are indicated. Treatment should be given for lymphatism and adenoid vegetations, which frequently coexist.

The prognosis is favorable and the cornea is never involved, as it is in the next disorder:

2. **Granular Conjunctivitis (Trachoma).**—This is a long-drawn-out and serious disease, with corneal involvement, and is *transmissible* (stringent prophylaxis indicated when there is a discharge).

This condition cannot be regularly treated without the *constant* co-operation of an ophthalmologist, the use of strong caustics (silver nitrate, copper sulphate, etc.), direct manipulation (massage with powdered boric acid, scarifications, brushing, scraping, thermocauterization, applications of jequirity, operations for pannus, trichiasis and symblepharon) being indispensable for months and sometimes years if this process, which is subject to recurrences, is to be cured.

3. **Vernal Conjunctivitis.**—In this disorder, frequently returning in the early spring, prolonged and periodic treatment by the ophthalmologist is required. General treatment by means of arsenic, organotherapy, climatotherapy (altitudes) and arsenical waters is indicated.

4. **Parinaud's Conjunctivitis.**—This is very different, in its mild course, from trachoma. The diagnosis and treatment rest with the ophthalmologist.

5. **Lesions Accompanying Skin Disturbances.**—This group includes the *evanescent* but large-sized papules of *erythema multiforme*, the

blebs and scars of *pemphigus*, etc., to be referred to the specialist, as are likewise conjunctival *syphilis* (chancre, papules, gummas), *tuberculosis*, *leprosy*, *mycoses* and *parasitic disorders* (filaria).

6. **Conjunctivitis in the Eruptive Fevers.**—See further on: *Eye Complications in General Diseases*.

7. **Pustular Kerato-Conjunctivitis** (wrongly termed **phlyctenular conjunctivitis**, as the pustules are solid and contain *no* fluid).—This condition should be treated as soon as possible in order to obviate extension to the cornea and a more or less indelible scar. It is the great eye disease of scrofulous children.

MEASURES INDICATED:

In the very great majority of cases, **yellow oxide of mercury ointment** is in itself sufficient to keep the pustules from invading the cornea. In this disorder *nothing* can entirely replace yellow oxide ointment; nothing else equals or surpasses it.

GENERAL TREATMENT is of value, especially *after* the pustular attack (organic iodine preparations; iodine, biniodide and phosphate syrups; a little mercury; codliver oil, arsenic, tannic acid, *diet*), but without yellow oxide ointment it will not cure the disease. One should not cherish the belief that a stay at the *seashore* will suffice to yield a cure; scrofulo-impetiginous conjunctivitis frequently sets in there and, without the yellow oxide ointment, remains very severe. The child should be sent to the seashore *after recovery* from the keratitis. The yellow oxide ointment has taken the place of the red oxide ointment, which is less effective in the treatment of this disease; the former exerts a *specific* action, which has even been held sufficient to establish the diagnosis.

If the desired action on the part of the yellow oxide ointment is to be exerted, the ointment must be properly prescribed and applied *once* a day, and not several times a day, in the evening, with a probe, ear-pick or other flat object *within the lower lid*, and not merely *over* the lids or lashes.

Strong preparations (5 per cent.) are unnecessary. I often add a little **guaiacol** to the yellow oxide, in the following proportions:

℞ Hydrargyri oxidi flavi	0.15	gram	(gr. iiss);
Guaiacolis (synthetic)	0.05	c.c.	(m ¾);
Adipis lanæ hydrosi	6	grams	(3iss);
Petrolati liquidi	4	c.c.	(f3j).—M.

(The yellow oxide should have been prepared by the wet process, washed and triturated.)

Simpler bases—hydrated wool-fat, 1 or 2 grams (15 or 30 grains); petrolatum, 8 or 9 grams (120 or 135 grains)—also yield good results. The wool-fat, absorbing water, is always useful to promote adhesion

of the ointment to the mucous surfaces. Petrolatum alone should be prescribed only if the wool-fat is unobtainable. A mixture of wool-fat and petrolatum in equal parts should also be avoided, being much too firm.

Nasal and *pharyngeal* disorders should receive treatment (rhinitis, adenoid vegetations).

PROCEDURES TO BE AVOIDED:

An *occlusive dressing*. A loose shield is to be preferred, and later, smoked glasses.

Copious *irrigations*. There is nothing to remove over a pustule.

Zinc sulphate, copper, and other astringents and caustics, except in the event of added catarrh.

Hot compresses or *sprays*, and *atropine*, quite unnecessarily prescribed from the start. No blisters nor setons. Calomel insufflations are to be reserved for the treatment of corneal scars. Calomel should be avoided if the patient is taking iodine internally (formation of the caustic biniodide, irritating the conjunctiva).

Obstinate cases should be referred to the ophthalmologist *in time*.

Lithiasis Conjunctivæ.—Removal of the concretions, *often very numerous*, which wound the cornea every time the lids close, is indicated.

Growths.—Pinguecula, pterygium, dermoids and various tumors, benign or malignant. Operative treatment by the specialist is in order.

Disorders of the Lacrymal Caruncle.—These consist of furuncles and tumors identical with those of the *ciliary margin*, of like structure and amenable to the same treatment.

DISEASES OF THE CORNEA.

The first step should be to determine whether one is dealing with an *exogenous* lesion (eruption or ulcer), with primary loss of substance, or an *endogenous* lesion (parenchymatous infiltrations, secondary necroses). With a probe or pinhead sterilized in a flame, one should always test the degree of sensitiveness or lack of sensation of the cornea (*neuroparalytic keratitis* due to lesion of the trigeminal nerve, in which the *customary* remedies for an ordinary ulcer would soon complete the destruction of the cornea).

1. Superficial Keratitis.—**Vesicular Keratitis.**—*Herpes* of the cornea is seen in two distinct stages, the vesicular and the post-vesicular. Cauterizations and strong drugs must be absolutely avoided. The organic silver preparations should alone be used (argyrol, 10 per cent., several times daily in solution or ointment). Cocaine, which has an exfoliative effect, and copious irrigations should be avoided.

Atropine may be used if there is sharp pain. A light dressing or smoked glasses may be employed. Diet and other treatment should be strictly applied to herpetic, intoxicated, constipated subjects.

Corneal herpes sometimes exhibits an elongated, non-vesicular form, with small ulcerations constituting narrow grooves in the cornea (keratitis dendritica, with a branching appearance), especially in the course of influenza. Ointments of argyrol, of 1 per cent. zinc peroxide or of 1 per cent. atropine may be used. An occlusive dressing should be applied. The specialist will, if necessary, apply derivative topical agents (dionin) or carry out certain manipulations (subconjunctival injections, cauterizations, etc.) to reduce the tendency to indelible scars in the cornea.

In the *acute stage*, yellow oxide ointment should be avoided, as it would prove *very irritating* in these cases.

The same treatment, on the whole, is applicable in keratitis *bullosa* and in *filamentous* keratitis, atropine being, however, avoided in the latter condition because of its favoring the production of filaments.

Corneal Ulcer and Abscess.—This condition, unless exclusively the result of traumatism with infection, is nearly always associated with a chronic infection of the lacrymal sac (dacryocystitis), nasal cavities (ozena) or lids. It is a most serious disorder, to be referred as an *extreme emergency* case to the specialist, in order to avoid a *phagedenic* process of the cornea, perforation and finally suppurative panophthalmitis. The specialist will take energetic measures, which he alone should apply (actual cautery, subconjunctival injections, and operation on the lacrymal sac, if indicated) to reduce the resultant opacity.

In the period elapsing before the specialist sees the case, yellow oxide ointment, silver nitrate and zinc sulphate should be *avoided*, as they are ineffectual and irritating. Adrenalin and cocaine, ice and cold applications are also to be avoided. Irrigations with boric acid or other solutions are altogether inadequate. Very hot wet compresses should be applied several times a day. Atropine, 1 per cent., morning and evening, is indicated. Argyrol, 10 per cent., should be used five or six times in the twenty-four hours. Instillations of enesol and application of a 1 per cent. zinc peroxide ointment on arising and retiring are serviceable. The lacrymal sac should be frequently emptied by digital pressure.

In ulcer due to protracted or incurable facial paralysis, an argyrol or zinc peroxide ointment should first be used, and the lids kept accurately approximated with strips of zinc oxide plaster. If the ulcer tends to spread, the specialist should be requested to perform a median, or better, *medio-internal* (A. Terson) partial fusion of the lids—

the best permanent dressing and support of the cornea. The *post-ciliary* bridge of tissue should be reduced, and then completely divided, only if the facial paralysis is recovered from.

In cases of excessive **exophthalmus** (goiter, neoplasm, etc.), a broad median tarsorrhaphy should be performed as an emergency

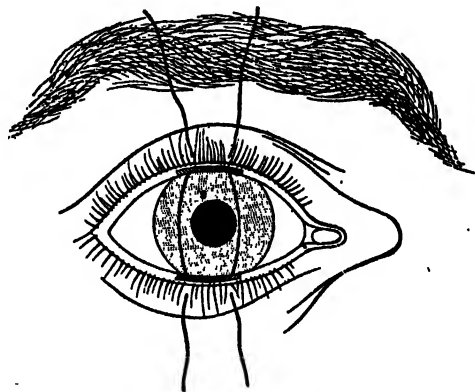


Fig. 365.—Median tarsorrhaphy.

operation, to be facilitated, if required, by liberating incisions in order to obviate the otherwise frequent loss of both corneas in their exposed and dried condition.

2. Deep Keratitis.—(a) **Neuroparalytic Keratitis.**—This is dependent upon changes in the trifacial nerve. There is loss of sensitiveness of the cornea with rapid *necrosis*. *As soon as the loss of sensitiveness is*



Fig. 366.—Median tarsorrhaphy in neuroparalytic keratitis, showing the result of the operation.

noted, the specialist should be called upon to stitch the lids together, leaving, however, two unstitched portions at the sides. Argyrol and atropine in ointments are serviceable, but caustics and powerful antiseptics must be absolutely avoided. Before the operation (not to be delayed) the foregoing remedies should be used and a dry occlusive dressing applied.

(b) **Interstitial or Parenchymatous Keratitis.**—This may be either circumscribed or diffuse, the latter condition being nearly always referable to acquired or, more particularly, inherited syphilis (Hutchinson). The two eyes may be involved in succession, sometimes at very long intervals.

The diseased cornea only rarely becomes ulcerated (gumma); the whole disturbance reduces itself to a cellular infiltration and corneal opacities. The patient should be sent to the specialist, who will see to the details of the diagnosis, treatment and prognosis of this disease, which lasts several months and recurs easily.

To begin with, all irritant or caustic remedies should be avoided, as the disease is *endogenous* and unattended with loss of substance. No occlusive dressing is indicated. Smoked glasses or a shield should be used. The general treatment is that of congenital syphilis, often associated with tuberculosis.

The specialist will decide upon the alternations in the local treatment (hot applications, atropine, dionin, etc.). He alone will be able to say *when* the time comes to institute certain measures to reduce the opacities and improve vision (subconjunctival injections, periocular cauterizations, sometimes iridectomy). The practitioner should realize that no general or local treatment can with certainty prevent the fellow eye from developing, sooner or later, parenchymatous keratitis like the first eye; also, that the *prognosis* of this condition is, *with few exceptions, favorable*, the interstitial infiltrations improving greatly with the lapse of time and under local and general treatment.

3. **Corneal Scars (Leukoma).**—Various local measures, glasses, and operations (artificial pupil corresponding to clear portion of the cornea) may be availed of.

4. **Bulging of the Cornea.**—In *opaque staphyloma*, a resection of the cornea and iris may be performed and a movable stump made for the support of an artificial eye, with good cosmetic results.

In *keratoconus*, characterized by a conical semi-transparent bulging, the treatment consists in the wearing of glasses; compression, with or without median stitching of the lids, and occasionally direct operations (reduction by cauterization, iridectomy, removal of the lens, etc.).

5. **Tumors.**—Circumscribed extirpation, or enucleation of the eye, according to whether the corneal tumor is of internal or external origin.

DISEASES OF THE SCLERA.

Superficial and Deep Scleritis.—Intensive *general* treatment of any distinct *etiologic condition* (rheumatism, gout, syphilis, tuberculosis, etc.) is indicated. In the frequent cases in which the cause cannot be demonstrated even by the most modern and thorough procedures, *therapeutic tests* (arsenic, mercury, etc.) should never be abstained from. *Foci* of metastatic infection (urethra, uterus, intestine, etc.) should be investigated and treated.

Smoked glasses or a *slightly* compressive dressing may be used.

All of the collyriums commonly used in conjunctivitis should be *avoided* (no silver nitrate, zinc sulphate nor copper sulphate, which make these cases worse).

The selection and prescription of certain collyriums (adrenalin, dionin, etc.), of bleeding and of local procedures such as subconjunctival injections, actual cauterizations, etc., which are very useful in *refractory* scleritis, should be left to the ophthalmologist.

Staphyloma of the Sclera.—Partial operations may be performed which will yield a less deformed eye or one which can be covered with an enamel shell. Sometimes enucleation is necessary.

The treatment of **traumatism** of the sclera cannot be considered apart from that of traumatism of the entire organ, already discussed.

Congenital pigmentation of the sclera (*melanosis scleræ*) is an incurable condition.

Tumors of the sclera, which are very exceptional, should be excised, unless they are secondary to intraocular neoplasms, in which case enucleation is indicated.

DISEASES OF THE LACRYMAL APPARATUS.

These are common, distressing disorders, not without risk as regards the visual function, as stenosis with lacrymal stagnation and mucopurulent dacryocystitis often lead to corneal ulcer or even supuration of the entire eye (panophthalmitis).

When treated *too late*, these affections are hard to relieve, and the local treatment (probing the duct, systematic dilatation, medicinal injections, various operations) concerns the specialist, lest more harm than good be done by wounding the lacrymal duct. Following are merely the indications for the treatment:

I. Diseases of the Lacrymal Glands.—*Causal* and *medical* treatment of syphilitic, tuberculous and gonorrheal *dacryoadenitis* and of that attending *mumps* and Mikulicz's disease (simultaneous inflammation of the

salivary and lacrymal glands). *Surgical* treatment of displacements, abscess, concretions, cysts and tumors, the orbital gland being dealt with through a *skin* incision along the eyebrow and the inferior (subconjunctival) gland *through the conjunctiva* of the supero-external cul-de-sac.

II. Diseases of the Lacrymonasal Duct.—The patient should be urged to have himself treated *as soon as possible*, even for a simple epiphora, which points to a latent stenosis of the nasal duct, now beginning to make itself known after already being present for months or years.

1. **Epiphora.**—Pressure on the lacrymal sac causes no outflow of “matter” at the puncta. Probing and injections will alone demonstrate the *degree of permeability* of the sac and duct, as there do occur rare instances of epiphora due solely to *hypersecretion* (exophthalmic goiter, dental caries, etc.).

The specialist will test, after dilatation of the lacrymal points, how an injection and an *olive-tipped sound of fair caliber* (No. 2, avoiding No. 1, which would cause too much local injury) pass through. If the *inferior punctum* is everted, it should be incised obliquely (meatotomy), and systematic dilating treatments with *olive-tipped* sounds of progressively increasing size instituted, at first two or three times a week.

This treatment will cure or greatly improve the epiphora. To obviate recurrence, the dilatations should, as in the case of the urethra, *never* be given up entirely, but continued at least once or twice a year after an initial course of treatment.

Where the epiphora is reduced but not checked, removal of the inferior (*accessory*) lacrymal gland will yield a completely successful result, as also in epiphora due solely to hypersecretion.

2. **Stenosis with Mucoïd Discharge.**—The treatment consists of progressive dilatation to a wide caliber, which varies with individual tolerance. Medicinal injections (silver nitrate, etc.) should be used.

In refractory cases, dacryo-rhinostomy, or else actual or chemical cauterization of the sac, which is often tuberculous. Sometimes prompt extirpation of the sac is indicated.

3. **Encysted Dacryocystitis.**—The lacrymal sac or its diverticula, transformed into a closed cavity, should be removed like a cyst.

4. **Calculi and Foreign Bodies.**—These should be extracted through a skin incision or the natural channels, according to their location.

5. **Abscess In and Around the Lacrymal Sac.**—After having made an attempt at abortive treatment, as for carbuncle, and given some relief with continuous, *very* hot applications, the practitioner may evacuate through the skin the pus manifestly formed.

The specialist will then take steps to restore the lacrymal channels by regular dilatations.

6. **Fistula of the Lacrymal Sac.**—To be referred to the specialist for the same purpose.

7. **Syphilis, Actinomycosis, Tuberculosis, etc.**—In gumma of the lacrymal sac, treated in time, before much tissue destruction has occurred, purely medical treatment is remarkably effective. *General* treatment should, of course, never be neglected in lacrymal disorders of tuberculous or other origin.

8. **Impassable Obstruction.**—Extirpation of the accessory lacrymal gland may be carried out to reduce the epiphora. Attempts may be made at plastic restoration of a lacrymonasal duct (dacryorhinostomy).

9. **Dacryocystitis of the Newborn.**—This is nearly always dependent upon a *temporary* imperfection of the nasal duct. The treatment should be limited to instillations (argyrol, zinc sulphate, etc.) and to *strong* pressure made several times a day over the lacrymal sac, thus promoting spontaneous opening of the obstructing diaphragm and *abrupt* cure. Probing is very rarely indispensable in these cases.

Every patient with an improved dacryocystitis, but still exhibiting "gleet" from the sac, should be directed to make pressure over the sac frequently in the course of the day in order to empty it completely. He should wash his eye with boiled water several times daily and return to the physician *at once* if the eye becomes red and painful (ulcerative keratitis, requiring emergency treatment).

DISEASES OF THE ORBIT.

Traumatism.—Treatment for foreign bodies, sometimes overlooked, should be applied after an X-ray study has been made. Treatment for fracture and post-traumatic hematoma, emphysema, abscess, phlebitis or meningitis may be indicated.

Spontaneous Infections.—1. **Tenonitis.**—Inflammation of the oculo-orbital fascia is generally a relatively mild disorder, of rheumatic origin and unattended with suppuration. The treatment is the same as that of *acute* or chronic rheumatism. Hot applications and blood-letting from the temples may be availed of.

2. **Phlebitis.**—Treatment of the cause (carbuncle, peridental abscess, phlegmonous rhinitis or sore throat) and of the general condition (collargol, electrargol, milk, serum treatment, fixation abscess, etc.) is required in the attempt to prevent extension of the disorder to the sinuses of the dura—an almost incurable condition.

3. **Abscess.**—Same emergency treatment; abortion of the process is a possibility. Incision of the focus of suppuration is indicated.

4. **Osteoperiostitis.**—Treatment of the cause (syphilitic gumma, tuberculosis, actinomycosis, etc.).

Vasculonervous Diseases.—1. **Exophthalmic Goiter** (*q.v.*).—Emergency stitching of the lids together if the prominent cornea is tending to become ulcerated.

2. **Pulsating Exophthalmus.**—Injection of gelatin-saline solution, as for aneurysm. Digital compression of the common carotid for several hours a day. As a last resort, ligation of the common carotid of one side; sometimes ligation of that on the opposite side becomes necessary, with or without retinal (thrombosis) and cerebral complications.

Tumors.—1. **Parasitic.**—Cysticerci and hydatid cysts should be removed, if possible, as medicinal injections and electrolysis are too often followed by recurrence.

2. **Vascular.**—Electrolysis or extirpation, according to the case, in the event of failure of X-ray treatment, which, however, generally proves very effective.

3. **Miscellaneous**, benign or malignant, primary or secondary (nasal cavities).—Extirpation of the tumor; sometimes complete curettage of the orbit. General and X-ray treatment in the event of recurrence or in inoperable cases.

Before any operation is performed, general therapeutic tests should be applied (syphilitic pseudo-tumors, lymphoid growths, etc.).

DISEASES OF THE EYELIDS.

DEFORMITIES OF THE PALPEBRAL FISSURE.—I. **Congenital Anomalies.**—In coloboma ("palpebral hare-lip"), epicanthus (fold of skin concealing the inner portion of the eye), etc., operation is indicated.

II. **Non-Occlusion.**—1. **Paralytic.**—In ordinary *facial paralysis*, the treatment should be limited to the application to the cornea, morning and evening, of sterilized vaselin, or an oily collyrium (1 per cent. procaine). A loose shield may be applied, but not a compression dressing, which would become adherent to the cornea of the half-open eye and cause it to ulcerate.

If the cornea shows a tendency towards erosion, strips of *zinc oxide taffeta* should be applied daily; this material holds better than court-plaster and is preferable to diachylon plaster. If the ulcer extends or the paralysis is incurable, the ophthalmologist should be called upon to do a partial postciliary stitching of the lids (*tarsorrhaphy*) in order to protect the cornea. This tarsorrhaphy should be of the median, or better, the *medio-internal* variety (A. Terson), which allows the eye to see while protecting

it. The bridge of tissue should not be cut until the paralysis is cured and the eye is out of danger.

In some cases of incurable paralysis, R. Leriche has obtained good results from the retraction of the eye following section of the cervical sympathetic.

In the treatment of facial paralysis amenable to treatment of the cause, one should beware of ill-directed electric treatment, which leads to disfiguring contractures of the orbicularis muscle.

2. **Ectropion.**—(a) **CICATRICAL.**—Restoration of the eyelids by a plastic flap operation (blepharoplasty).

(b) **SPONTANEOUS.**—Operation for senile ectropion (resections of the skin and conjunctiva, in Terson's procedure).

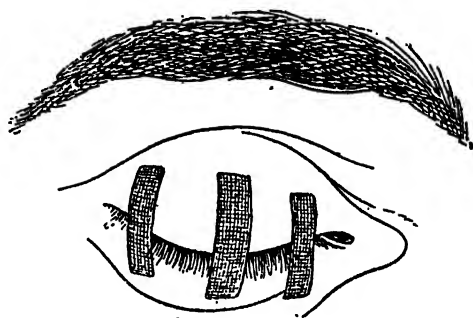


Fig. 367.—Closure of the eye with strips of zinc oxide plaster.

3. **Blepharoptosis.**—Medical treatment of the cause (syphilis, etc.). Surgical treatment of the incurable cases, often congenital; otherwise, palliative measures (special spectacles, rubber bands or spring clamps holding up the lid, etc.).

4. **Blepharospasm and Blepharotic.**—Medical treatment of the cause.

5. **Entropion.**—Operation for entropion, which is sometimes complicated by trichiasis (inward deviation of the eyelashes), symblepharon, etc.

CUTANEOUS AND SUBCUTANEOUS DISORDERS.—The treatment is the same as in skin disorders elsewhere (erysipelas, anthrax, cellulitis, emphysema, primary and secondary syphilis, leprosy, tuberculosis, etc.). Special treatment for various conditions (molluscum, acne, xanthelasma, etc.).

Furuncle and Hordeolum (Stye).—Very hot applications. Hygiene and diet for furunculosis. General abortive treatment may be tried. Incision as soon as pus has formed.

Chalazion (*inflammatory tumor originating in a Meibomian gland*).—According as the swelling is external or internal, removal through the *skin* or careful curettage through the *conjunctiva* is indicated. Chalazion is *sometimes* cured under medical treatment (hygienic measures, antiblepharitic ointments).

Skin Affections of the Ciliary Margin (Blepharitis).—Hygienic measures, diet and *general* treatment appropriate for the existing *variety of skin disturbance*, duly diagnosed, should be applied, rather than treatment based on vague conjectures.

Local Treatment.—Alkaline (sodium borate, sodium bicarbonate; avoid boric acid) and slightly soapy eyewashes.

Treatment of coexisting conjunctivitis, *dacryocystitis* or rhinitis.

Application of ointments, at first very mild (1 per cent. zinc peroxide), morning and evening; then, if insufficient, stronger ointments (yellow oxide of mercury). If there are *follicular abscesses about the eyelashes*, epilation, expression and treatment with 1 or 2 per cent. silver nitrate solution are indicated, *absolutely avoiding the silver nitrate stick*. A 1 per cent argyrol ointment may be used. The specialist should be consulted in refractory cases.

Be on the lookout for parasites. Pediculosis of the eyebrows and lashes is quickly cured by partial epilation and antiblepharitic ointments.

Tumors.—The X-ray is splendidly effective in angioma. Benign tumors (cysts, etc.) may be removed. Malignant tumors should be excised *early*. X-ray treatment in inoperable cases.

MOTOR ANOMALIES OF THE EYEBALLS.

STRABISMUS.—Squint *without ocular paralysis* calls first of all for *orthoptic* treatment, which the ophthalmologist will alone direct. This orthoptic treatment is capable of reducing only *mild* grades of strabismus, with a natural tendency toward recovery. The operation for strabismus, consisting of tenotomy or advancement or shortening of the tendons of the eye muscles (to be decided on individually or combined, according to the case), should *never* be carried out in *small* children, lest excessive or merely temporary results be produced.

The proper time for the operation is *adolescence*. Operation then becomes necessary in about two-thirds of the cases in order to correct the anomaly of position and assist the action of spectacles and procedures of ocular training. The latter, despite all biased assertions to the contrary, is *nearly* always insufficient to relieve a defect from which the patient will permanently suffer. "Campaigns" for or against *exclusively* operative or

orthoptic treatment merely serve to promote abuses. The operation should not be postponed too long, as the results in adults are not as good as in adolescents.

NYSTAGMUS.—Treatment of the cause (neuropathic nystagmus of miners, congenital syphilitics, etc.) and orthoptic training.

OCULOMOTOR CONTRACTURES AND PARALYSES.—The diplopia should first be relieved by covering with opaque glass. Cautious electric treatment is in order.

Intensive treatment of the cause is often very rapidly effective (syphilis, tuberculosis, diabetes, tumors, general infections, etc.). One should never hesitate to prescribe mercury and arsenic for test purposes, even when the serum and other reactions are negative. Operation is indicated in incurable paralyzes of long standing.

DISEASES OF THE IRIS.

ACUTE IRITIS.—While awaiting the ophthalmologist, the pain should be allayed, contraction and adhesive tendencies of the pupil antagonized, and general causal treatment instituted.

1. **Dilatation of the Pupil.**—Atropine should be used if palpation elicits a *normal* intraocular tension.

R Atropinæ sulphatis 0.05 gram (gr. $\frac{3}{4}$);
 Aquæ destillatæ 10 c.c. (f℥iiss).

S. Sig.: Two drops in the morning, and again in the evening, to begin with.

Cocaine, 2 per cent., may be alternated with the atropine, at two additional times in the day. *Euphthalmin*, 4 per cent., is indicated if conjunctivitis is produced by the atropine. *Scopolamine* is more toxic than atropine, the other substitutes for which (*duboisine*, etc.) are likewise being little used.

Adrenalin should be *avoided*; after giving relief for a few minutes it will increase the pain and ocular hyperemia.

Smoked glasses or a loose covering are indicated. The compression bandage should be avoided.

2. **Relief of Pain.**—The pupillary dilatation and atropine already afford considerable relief; in addition, **heat** is particularly effective in these cases. Lavage which causes friction of the painful eye is to be avoided. Compresses or cotton rings dipped in very hot water and covered with an impervious material may be recommended first of all, but nothing equals **linseed poultices**, which are even more effective than starch-flour or other poultices. Boiled gauze should be interposed between the poultice and the eyelids. The poultice should be

very hot and applied as often as the patient feels pain but only when he does feel pain.

3. Treatment of the Cause.—The *urine* should be examined for sugar and albumin. Attention should be given to the possibility of an overlooked or concealed syphilitic infection and of other appreciable causes (tuberculosis, gonorrhea, etc.), and any such conditions found should be treated thoroughly by the usual means.

Sodium salicylate and acetylsalicylic acid exert a favorable effect even in iritis not of rheumatic origin. They may be perfectly well combined with mercurial treatment employed for the same purpose.

In cases in which *no cause* can be found, a course of anti-infectious treatment (electrargol, milk injection) should be instituted after the arsenic and mercury treatment. A search should be made and proper treatment applied for all possible *foci of infection* (teeth, intestine, urethra, uterus), deficient functions or probable diatheses.



Fig. 368.—Iridectomy.

Refractory Cases.—If the patient is not sufficiently relieved or if he is wakened *at night* by attacks of pain, there should be added to the treatment:

1. Three or four **leeches** over the temple, these being better borne than wet cups. Cups and blisters do not afford a reliable analgesic effect.

2. Application (by the ophthalmologist) of **ethylmorphine hydrochloride** (dionin).

Opium, morphine and dionin will promote sleep through their analgesic effect, whereas antipyrin, pyramidon, chloral hydrate and barbitol will not always act sufficiently. Injections of sterilized milk (5 cubic centimeters—80 minims—boiled for five minutes) sometimes exert a pronounced action. If need be, the ophthalmologist may undertake a **puncture (paracentesis)** of the anterior chamber.

In the later treatment, the mydriatics should not be stopped *too soon*, even if the eye shows little redness and is not painful, lest a relapse occur.

In *chronic iritis with occlusion of the pupil*, sometimes attended with increased intraocular pressure, excision of a piece of the iris (Fig. 331) is

indicated. A timely iridectomy will save one or both eyes which would otherwise have been lost or which, *after undue delay, would no longer have benefited* from the operation.

This operation should, however, never be carried out during the course of the inflammation. The fenestra in the iris would soon become plugged, and trauma in an inflamed eye predisposes to sympathetic ophthalmia. Occlusive iritis should be operated upon only after the inflammation has completely subsided.

DISEASES OF THE CRYSTALLINE LENS.

DISLOCATION.—The case should be referred for removal of the displaced and badly tolerated lens. Beforehand, as this condition predisposes to glaucoma, the practitioner should prescribe instillations of pilocarpine nitrate or hydrochloride, 1 per cent., twice a day.

CATARACT.—Any cataract calls for extraction of the lens (the old operation of reclinatio*n* being now almost completely abandoned):

1. When the cataract is *ripe* and complete, permitting of *entire* and correct removal of the *opaque* lens.

2. When the fundus is not the seat of a *lesion* (detachment of the retina, atrophy of the optic nerve, glaucoma, etc.) such as would render the extraction of the lens *useless*.

3. Provided any existing *local infectious condition* (purulent *dacryocystitis*, *ozena*, *blepharitis*, etc.) has been cured, in order to avoid disastrous suppuration of the operative wound.

4. When the *general condition* permits (diabetes, nephritis, and all organic defects and diathetic states should have received due treatment).

Partial cataracts, whether acquired or congenital, do not call for extraction if an operation confined to the iris (optical iridectomy) is capable of improving vision, without involving the semi-transparent lens.

Extraction (and urging toward extraction) of cataracts as yet but *slightly advanced* should be conscientiously avoided, lest complications occur that may lead to the loss of the eye. A preliminary iridectomy should be performed under these conditions.

On the other hand, operation for cataract, even when complete, may be postponed for a long time if vision in the *other eye* is still very satisfactory.

Medical treatment (iodide collyriums, iodine internally, etc.) is applicable only to *beginning* cataract, in which it seems sometimes to retard or check the progress of the disease, at the same time reducing the

patient's anxiety and his frequent fear of an operation, to which, nevertheless, he will not always have to submit.

DISEASES OF THE FUNDUS OCULI.

Previous to the necessary consultation with the specialist, which will afford a more accurate diagnosis and prognosis through endoscopic examination and determination of the visual acuity, field of vision and refractive state, the practitioner may, after a *complete examination* of the patient and all his functions, institute *provisional* treatment. While avoiding the making of even a probable diagnosis, and without making any reference to operation, which is seldom applicable in these cases, he may proceed with **preliminary measures**, consisting of the withdrawal of blood, blistering, foot-baths, laxatives, special remedies and diet, based on the results of the complete examination he has made. He should provide for **emergency indications** (*injection of salt solution after severe hemorrhages*, physical and psychic treatment of *nervous attacks*—and *cerebral*, cardiac, uremic manifestations or high blood-pressure). *Rest in bed*, a *soft*, reduced *diet of low toxicity*, and *silence* and *darkness* are all indicated.

He should avoid instillations and eyewashes (boric acid solution, zinc sulphate, etc.) which are irritating and sometimes dangerous (*atropine*), but, on the other hand, should not hesitate to instil immediately a *useful* collyrium such as one of *pilocarpine* if the eye is found *hard* on palpation..

The physician should, in addition, institute the *treatment of the cause*, based on the positive findings in his general examination of the patient; the consultation with the specialist will then supply the foundation for the remainder of the treatment. The practitioner will find himself constantly in his own field, for the *etiology* of an intraocular disease is always complex. Aside from the *predisposing* (anomalies, etc.) and *exciting* causes of various kinds related to the eye itself, the sources of *personal* and *hereditary infection* and *weakness* play a constant rôle in the initiation and recurrences of the disease.

The treatment, thus a "polyvalent" affair, should be based largely on this investigation. It should have for its purpose, while treating the *pre-dominant* cause, though not confining itself to it, to combat likewise the *associated* factors which play their part in the morbid state as a whole. In the majority of eye diseases treatment of the eye alone is an absurdity, just as it is not enough to prescribe *exclusively* what is regarded as a "specific" treatment in a rheumatic, a tuberculous or even a syphilitic patient. In addition all *functions* and *organs* must be improved and all

foci of infection or intoxication must be treated if the local and general measures are to yield the best results. In this manner, unexpectedly successful cases will be obtained, together with a favorable influence, often neglected, on a host of lesions which, *e.g.*, even in recognized syphilitic or tuberculous subjects, are neither purely syphilitic nor purely tuberculous in nature, are not exclusively "specific" (but hybrid), and are not dependent upon a single cause even if the latter plainly dominates the clinical situation and the principal treatment to be applied. This viewpoint applies, in my opinion, to all the specialties just as it does to general medicine. For over thirty years I have been teaching it and constantly applying it in practice.

Where the cause cannot be found, everything that appears abnormal in the general functions of the patient should be treated, and the probable morbid heredity should be taken into account in this connection.

DISEASES OF THE VITREOUS BODY.—*Muscae Volitantes*.—This symptom is most common in myopic subjects and neurasthenics. It is not always of very serious portent, but constitutes a warning to the patient to spare his eyes by avoiding fine work and night work, as well as nervous, sexual and mental overstrain. The local treatment (subconjunctival injections, collyriums, glasses, etc.) should be coupled with a general psychopathologic treatment (suggestion, detoxication, sedation, and the treatment of all organic defects and diatheses).

Severe Hemorrhages in Young Individuals.—These call for rest in bed, the injection of emetine, and the treatment of tuberculosis, often observed in such cases.

Endogenous Suppurative Panophthalmitis (pyemia, etc.).—The eye can nearly always be preserved, even though reduced in size and sightless. Immediate enucleation is unwise.

DISEASES OF THE CHOROID AND RETINA.—In addition to the local treatment (revulsive measures, periocular injections), there should be intensive *causal* treatment (acquired or inherited syphilis, tuberculosis, arteriosclerosis and high blood-pressure, diabetes mellitus, Bright's disease, etc.) of these various disorders, which are in most instances chronic.

Complete *detachment* of the retina, most common in myopic subjects, calls, in addition to general measures and rest *in bed* for the first few days, for local treatment (revulsive and osmotic subconjunctival injections, sometimes puncture); only exceptionally is it recovered from. Re-

moval of the eye is indicated if the retinal detachment is associated with an intraocular malignant tumor.

INTRAOCULAR TUMORS.—Such tumors sometimes perforate the globe and then call for operations involving both the eye and a part of the adnexa. *Sarcoma* of the choroid, still encapsulated, calls for immediate enucleation. Local recurrences are rare, though metastases (in the liver, etc.) always remain a possibility; yet we see persons still in perfect health twenty years after an enucleation for sarcoma of the choroid completely filling the eyeball.

Glioma (or neurocytoma, according to Mawrwas) of the retina, an *exclusive disorder of childhood*, is featured, in spite of enucleations and sometimes curettage of the orbit, by enormous recurrent growths locally and in the brain. The X-rays, used alone or in conjunction with operation, have yielded some favorable results.

GLAUCOMA.—**Acute Glaucoma.**—Untreated acute glaucoma soon leads to painful blindness.

It is important to overcome *at the earliest possible moment* the increased intraocular tension, which destroys the functions of the retina and optic nerve.

The practitioner has heard of an emergency operation, *iridectomy*, which de Graefe introduced in the treatment of glaucoma in 1856. It has given successful results in very many cases, but is a *very difficult* operation in *acute* glaucoma, and it is dangerous to attempt it unless one is an experienced ophthalmologist, as it is really *the most difficult of the operations on the eye*.

Accordingly, the practitioner should take care not to operate himself, *however great the apparent emergency* and whatever hazardous recommendations may be made in books on emergency surgery, on a glaucomatous eye, in which the hyperemic *conjunctiva tears* under the fixing forceps, the *anterior chamber is reduced in size*, the *pupil dilated*, and the eye very *painful* and hard to anesthetize, without special experience. *An unexpected movement on the part of the patient* will result in puncture of the lens and a *traumatic cataract*, the swelling of which further increases the intraocular tension. Furthermore, very good *assistance* is required in this operation.

This is an operation very different from the ordinary iridectomy, both as to technic and anatomic conditions.

The practitioner should, therefore, not listen to the ill-considered suggestions in this condition, which would lead to an irreparable disaster.

The patient and practitioner can *always* have an opportunity to resort to the specialist. Two or three days may elapse (eyes that have waited some ten days are being saved) even to great *advantage*, if the practitioner will place the eye in the *most favorable preparatory conditions for the operation*.

Measures to be Avoided:

1. *Irritant collyriums* (silver nitrate, zinc sulphate, yellow oxide ointment, boric acid eyewashes), which I have more than once seen employed as the *sole* treatment of acute glaucoma.

2. Atropine and other mydriatics. Fundamentally, any drug which dilates the pupil renders the eye harder.

3. A compression dressing. A loose compress or dark glasses should be used.

4. Irrigations.

5. Very hot compresses and *blisters*.

Measures Indicated:

1. Use of myotics. Pilocarpine nitrate in 1 per cent. solution, applied *five or six times a day*, is best borne.

Eserine is very irritating in an aqueous collyrium, less irritating in an oily one. It is a violently acting, *drastic myotic*, which the ophthalmologist alone should prescribe.

The practitioner should confine himself to pilocarpine, without mixing eserine and pilocarpine in the same bottle. In disregarding this recommendation he would be depriving himself of the *regular* alternate use of these drugs, which is valuable later on.

2. Apply several leeches to the temple.

3. A little dionin powder thrown into the eye sometimes leads, after momentary sharp discomfort, to a very distinct alleviation of the pain.

4. Chloral hydrate, barbital, and combinations of the latter are indicated when it is necessary to favor sleep. The improvement produced by a relatively comfortable night in the glaucomatous subject is obvious.

Morphine and opium also afford appreciable alleviation and tend to contract the pupil.

5. Very hot foot-baths, with salt or mustard. Laxatives and diaphoretics.

All these measures sometimes cause the glaucomatous attack to pass off, but *the patient must continue the pilocarpine*, lest the condition recur.

6. In all respects this treatment will have placed the eye in the best condition for the operation, which is indispensable when the *myotics* and certain *periocular injections* (adrenalin, etc.) have given no results.

Under such circumstances, there should be performed on this *somewhat relaxed, less painful eye, with its pupil less dilated*, an *iridectomy* with *entrance through the sclera*, which will frequently yield *lasting results*. In many of my patients recovery has been maintained for ten, fifteen or more years.

Sometimes *posterior sclerotic puncture* is alone possible, but iridectomy, with or without resection of one margin of the wound (Lagrange's *sclerectomy*), is the operation for most cases of glaucoma.

On the other hand, *hemorrhagic glaucoma*, *absolute glaucoma* and certain simple *chronic glaucomas* are not always benefited by iridectomy, but by various other procedures (sclerotomy, various punctures, sclerectomy). The same is true of the *buphthalmic glaucoma* of childhood.

Only rarely, unless there is an intraocular tumor, does it become necessary to remove a glaucomatous eye.

Chronic Glaucoma.—The treatment is started with *instillations of pilocarpine* and general measures, and the patients must never leave off the pilocarpine. Some of them, *at the proper time*, will have to undergo an *operation* (iridectomy, sclerectomy, etc.).

The general treatment of glaucoma, still under investigation, is directed to the alleviation of organic defects revealed by the complete examination of the case (nephritis, diabetes, arteriosclerosis, syphilis, heart disorders, *high blood-pressure*, etc.). Iodides should be avoided, as they tend to congest the eyes. A diet and stringent general hygienic measures similar to those recommended in arteriosclerosis should be prescribed.

SOFT EYES.—In contrast with the *hard eyes* of glaucoma, there occur also *flaccid eyes*, rarely on account of a *transient disorder* (*essential par-oxysmal ophthalmomalacia*), since, as a rule, an eye which is too soft is tending toward atrophy, with detachment of the retina.

These eyes that have become very soft are hardly amenable to treatment. It is better to have an unduly hard eye, as in glaucoma, than a softened eye. Myotic collyriums and operations will restore a practically normal pressure to the hard eye, but only exceptionally can a softened eye be restored to a persistently higher tension.

DISEASES OF THE OPTIC NERVE.—The general etiology and treatment are similar to those relating to diseases of the choroid and retina.

In the course of the *sclerosis* of the optic nerves which occurs in *tabes dorsalis*, the most recent treatment has, unfortunately, if *intensive*, proven itself capable of *rapidly aggravating* the atrophy of the optic nerve, and

so far has seemed utterly devoid of power to save the other eye from the fate of the first.

The opposite is the case in *inflammatory* forms of neuritis, especially when syphilitic, which appropriate treatment cures quickly and completely.

It is also very important, in the presence of optic neuritis, to think of a *tumor* of the orbit or an intracranial tumor. The neurologist and ophthalmologist, consulting with the practitioner, will settle the advisability of an operation (decompression, lumbar puncture, etc.)

A rather large number of visual disturbances for which the terms *amblyopia* and *amaurosis* have been set apart are not associated with *lesions* of the fundi. After having excluded *simulation*, the observer should investigate and treat the cerebral, general, neuropathic or other causes of the disturbance.

IV.—CORRECTION OF ABNORMALITIES OF REFRACTION.

The general practitioner cannot properly undertake to select glasses for his cases. Such selection, with few exceptions (*presbyopia*, slight *myopia*, etc.), requires, if a useful and *tolerable* result is to be obtained, a complete and accurate technical examination of the fundus of the eye and of all the objective and functional factors in vision, supplying definite knowledge as to how much of the visual deficiency is referable to a lesion or a mere optic abnormality, the latter being susceptible of correction by spheric, concave, convex or cylindric lenses or by prisms.

These abnormalities of refraction comprise *myopia*, in which the eye is *too long*, especially in its posterior segment; *hypermetropia* (*hyperopia*), its opposite; *astigmatism*, or irregularity of the *surfaces* of the cornea or lens, and *presbyopia*, or neuromuscular weakening of the power of accommodation for *near* vision, generally beginning at the age of about forty-five years. The normal eye, in which the parallel rays coming from objects situated at a distance of at least 5 meters are focussed on the retina, is said to be *emmetropic*. The eye is a species of living camera in which the defects of dimensions or surface can be corrected, in order to permit of the production of distinct images, only by the use of glasses.

While the practitioner cannot, without special training, intelligently select the glasses required, he must, in this connection, bear in mind certain indispensable therapeutic facts, forget certain prejudices, and defend himself against certain accusations.

The most easily corrected among the optic defects is **presbyopia**, which is overcome by *convex* lenses; these must, however, be changed at *intervals not exceeding two years*, unless some intercurrent ocular disorder has existed which has materially altered the refractive condition.

Astigmatism is corrected by *cylindric* lenses, concave or convex, requiring, in order to correspond to the irregular radius, *exactly horizontal* eye-glasses or the use of *spectacles*. Concave or convex corrections combined with the cylinders overcome the myopic or hyperopic states coexisting with the astigmatism.

Hyperopia is corrected by *convex* lenses of different power for distant and near vision. Beginning at the age of forty-two to forty-five years, presbyopia is added to it and requires an additional correction.

Myopia, as soon as it is somewhat pronounced, calls for the use of concave lenses. Markedly myopic eyes are far from being the best, as is sometimes thought, and are often the seat of serious late lesions. On the other hand, persons with low degrees of myopia are privileged to read without glasses to the ends of their lives, the myopia neutralizing the presbyopia of advancing age; this, no doubt, was what gave rise to the absurd belief that *all* myopic eyes are strong and get better as one grows old. *Very* low degrees of myopia gradually allow the presbyopia to assert itself; the individual then wears concave lenses for distant vision and convex lenses for near vision.

As soon as a child becomes myopic, the wearing of well selected glasses and special hygienic precautions are prescribed by the ophthalmologist in order to obviate *excessive* progression of the myopia as a disease of the growing period. The patient may be sent to him as soon as he can name the capital letters; it is unnecessary to wait until he knows how to read.

After having prescribed the glasses, the ophthalmologist will also formulate a general plan of behavior for the myopic patient. (See *Prophylactic Treatment of Eye Affections*). Confusion of true with *pseudo myopia* is to be avoided; some instances of *spasm of accommodation* give rise to *transient myopia* which is *curable by atropine*. *This is the only form of myopia which is recovered from.*

One should be on one's guard when a presbyopic subject no longer requires to have his glasses changed, *i.e.*, when he becomes myopic in old age. Rather often, the cause of this is an increase of the refractive power of the crystalline lens, ending in *cataract*.

Subjects with a very high degree of *hyperopia* should not be mistaken for myopes when they bring their work close to their eyes—really a paradoxical position, but one which is overcome by the wearing of *convex* lenses.

Anisometropia is characterized by a marked difference of refraction in the two eyes, the one being often in the opposition condition from the other in this respect. There are even some cases (myopia on one side and hyperopia on the other) in which it is best, ordinarily, not to wear glasses. In many other cases, however, a problem is presented which, upon expert examination, is amenable to an individual solution.

A group of *motor disturbances* of the eye (insufficiency or spasm of convergence, strabismus, pareses of muscles, etc.) call for the use of *prisms*, which may or may not be combined with other corrections.

This often applies in **headache of ophthalmic origin**, where no disease or lesion is found, but an error of refraction (especially astigmatism) and of the movements of the eyes is to be suspected. The wearing of suitable glasses affords immediate alleviation, even where headaches have been unsuccessfully treated with various remedies for years. It is nevertheless true that neurasthenic and constipated subjects are much less able to tolerate a visual anomaly than thoroughly healthy persons. While headache or migraine of ophthalmic origin thus certainly calls for proper refractive correction, general hygienic measures and tonic, analgesic treatment exert, in addition, an auxiliary effect which is not negligible.

Lack of space precludes our going into the details of the prescription of spectacles and eye-glasses and of the indications for the various kinds of mountings, often so poorly adapted to the distance separating the pupils.

In the numeration of correcting lenses, the unit of refractive power of a lens is known as the *diopter* (Monoyer). This is equivalent to the refractive power of a lens with a focal distance of one meter. Each diopter is further subdivided into 0.25, 0.50 and 0.75 D. [and in the case of lenses below 1.25 D, into 0.12, 0.25, 0.37, 0.50, 0.62, 0.75, 0.87, 1.00 and 1.12 D.]

V.—EYE COMPLICATIONS OF GENERAL DISEASES.

The majority of general diseases may be complicated by a disturbance of the eye; indeed, the majority of diseases of the eye represent merely a localization in this structure of a disease process capable of affecting all regions of the body. Neither in theory nor in practice, therefore, should they be considered in too specialized a manner.

Where the general condition is or has been definitely poor and well-characterized, the causal relationship and the treatment naturally correspond when the ocular complication supervenes. Less commonly is an eye condition seen to bring on a general disorder (tumor, etc.).

Sometimes an eye disease (iritis, retinal hemorrhage, pupillary disturbance) precedes a general disease and constitutes its precursor or its *initial localization*. Under these circumstances, the general disease has been first manifest in the eye. Later, the subject may become a frank case of Bright's disease, gout, arteriosclerosis or heart disease. At the time of the eye disturbance, the physician called upon to make a complete examination of the various functions and organs finds nothing. He declares that the patient is in perfect health, is in a better condition than he is, himself, etc. Actually, however, the eye disturbance was the first manifestation of a latent or overlooked toxic state, infection or degeneration. The patient's hygiene should be regulated and whatever is found subnormal treated without making any declaration as to its cause. Hereditary tendencies should be looked into two generations back.

The following presentation will be limited to a review of certain special features not dealt with in the general treatment as already discussed at length in this work.

Diseases of the Kidneys.—The treatment of nephritis, of whatever origin, even if syphilitic, very seldom yields, however correctly it may be carried out, any appreciable benefit as regards the eye: Albuminuric retinitis is influenced only when the condition is a temporary and curable one (scarlet fever, etc.). The retinitis is then recovered from along with the original disease.

No local treatment is effective.

In albuminuric retinitis in pregnancy, it is generally recognized that if the retinitis develops *in the first six months*, the child will die and the mother lose her sight. With few exceptions, induction of abortion is recommended under these conditions; similarly, *toward the end of pregnancy*, induction of labor is advised if the condition of the eyes becomes exceedingly serious.

Diabetes Mellitus.—There should be very careful general treatment of the different forms and combinations with nephritis which lead to mixed retinitis.

Local treatment of the other eye complications is indicated: Oculomotor paralyzes, iridochoroiditis and especially cataract. The latter disorder is operable after preparation of the patient as for any other operation in a diabetic. The results are generally good, al-

though the aftermath is somewhat less favorable, on the whole, than in non-diabetics.

Diseases of the Heart and Vessels.—The causal treatment is the only one possible, in conjunction with certain ocular and periocular proceedings (conjunctival revulsion, deep injections, etc.).

In severe hemorrhages (hematemesis, metrorrhagia, etc.), which sometimes lead to *blindness* with subsequent atrophy of the optic nerve, stress should be laid, if blood transfusion is not practicable, on copious injections of saline solution.

Diseases of the Respiratory System.—The nasal passages and ears should be treated in the course of the eye complications (epiphora, dacryocystitis, corneal ulcers, etc.) induced by adenoid vegetations, ozena, various forms of rhinitis, polyps and tumors. One should beware of the pseudo adenoid vegetations which invade the orbit and are nothing other than terrific sarcomas—this lugubrious diagnostic error is rare neither in children nor in adults.

The *peri-orbital sinuses* require treatment in a host of *secondary* disorders of the orbit and eye.

As regards the *lungs*, pneumonia and tuberculosis seldom lead to ocular localizations; such involvements are sometimes destructive and occasionally call for removal of the eye.

Diseases of the Digestive Tract.—Diseased *teeth* require thorough treatment in a large number of eye disorders of undetermined origin. Regular treatment of diseases of the stomach, intestine and liver is in order. Hepatic detoxication and relief of constipation are indicated in all deep seated disturbances of the eyes.

Hesperanopia (*hemeralopia*) is frequently related to an abnormal state of the liver, and in its treatment ingestion of *liver* in any of its forms is called for.

Diseases of the Male and Female Reproductive Organs.—Gonorrhea, especially that dating back a considerable time, and vulvitis, metritis and salpingitis of the same origin should be looked for and treated; they are common causes of acute or chronic iridochoroiditis.

Diseases of the Skin.—Diseases of the skin of the eyelids, as well as several diseases of the conjunctivæ, are merely eye localizations of disturbances of the general integument. The treatment of these conditions has already been described in the earlier section on *Diseases of the Eyelids*. At this point, I would urge dermatologists and general practitioners *materially to reduce the strength* of the ordinary dermatologic ointments when these are to be applied about the eye.

Diseases of the Nervous System.—Whether one is dealing with *infections, meningitis, tumors, hemorrhage, etc.*, the causal treatment, with or without addition of lumbar puncture and operations in the cranial or spinal regions, should be worked out along with the neurologist.

In respect of *tabes dorsalis* and *general paralysis*, one is compelled to admit that even the most intensive antisyphilitic treatment has not yet been successful in checking the sclerotic process in the optic nerves. It is even, unfortunately, a well-known fact that *very* energetic treatment unquestionably causes a *rapid aggravation* of the loss of visual power and sclerotic atrophy of the optic nerves.

In neurasthenia, ocular abnormalities (refractive defects, etc.), which increase the anxieties and sufferings of the patient, should be carefully corrected.

In amaurosis without organic disease, a cerebral or toxic disorder should first be excluded, and next *simulation* (malinger); after these, hysteropathism and inhibition should be treated.

General Infections.—In the *eruptive fevers* the condition of the cornea should be investigated daily. In smallpox and measles, the following ointment should be anointed on the parts three times daily: Argyrol and hydrated wool-fat, of each 1 gram (15 grains); petrolatum, 9 grams (135 grains). When the least degree of corneal erosion is noticed, the specialist should be called in.

In diphtheria, if the conjunctiva is involved, the same ointment should be used in addition to the serum treatment. If paralysis of accommodation with mydriasis develops, a 1 per cent. collyrium of pilocarpine nitrate should be used.

The very many acute and chronic *infections* (syphilis, tuberculosis, etc.) that may attack the eye like the rest of the body call for the local measures already referred to in addition to the general treatment. As regards syphilis of the eye, it is of interest to note the slight degree of efficacy of gray oil as compared to that of injections of mercury, arsphenamin, or bismuth. The old-fashioned mercurial inunctions exert a *rapid* effect, especially in *children*, in whom they reduce in a few days conditions of very pronounced exophthalmus due to intraorbital gummatous periostitis. Bismuth has assumed a very important place in the treatment, especially in nervous and congenital syphilis. All of these drugs can at times be prescribed in suppositories and under appellations which conceal their identity.

Toxic conditions are frequently attended with visual disturbances and sometimes with atrophy of the optic nerves. The prognosis varies according to the cause. In the ordinary type of *alcoholic and tobacco* intoxication with ocular reaction, the visual disturbance is little by little *completely*

recovered from, in the majority of instances, under a very strict régime at first, then merely a reasonable régime, with iodine and phosphates in alternation. [In methyl alcohol poisoning, on the other hand, permanent visual impairment or blindness results in about one-half the cases. Among the measures that have been recommended for this type of poisoning are sodium bicarbonate intravenously, lumbar puncture, Donovan's solution, pilocarpine, gastric lavage, emetics and diaphoretics, and stimulation of the optic nerve by negative galvanism.—Tr.]

VI.—REMOVAL OF THE EYE AND OCULAR PROSTHESIS.

Here, as elsewhere, it sometimes becomes necessary to remove the disease by removing the functionally destroyed organ.

Abuse of *enucleation* of the eye, though formerly more common, still exists. On the other hand, removal of the eye, carried out in time, saves the sight of the other eye or, in the case of a malignant tumor, the life of the patient. It is needless to dwell, therefore, on the demands made on the clinical judgment and conscience of the surgeon when the time comes to decide between conservation and extirpation of a structure which, *even if lost for the purposes of vision, must be retained* if it is not dangerous either to life or to vision and if it is not the source of intolerable pain.

Indications for Removal.—1. **Persistent Pain.**—Only extremely rarely do modern analgesic measures, local treatments and, on occasion, *partial* operations prove ineffective in this connection.

2. **Deformity.**—If the eye is too *large* (buphthalmus, staphyloma of the cornea, etc.), a reduced and conservative operation (resection) will afford a *movable stump* upon which an enamel artificial eye in the form of a shell will provide an excellent and invisible prosthesis, which is not the case after *complete* extirpation of the eye, as the artificial eye is then too deeply set and but slightly movable.

If the eye is very *small* and atrophied, it may often be covered, without being removed, with a suitable artificial eye.

Whitish corneas, with dense leukomas, can sometimes be tattooed.

3. **The Destroyed Eye is Dangerous to Life.**—While external, superficial tumors may be removed, this is not the case with malignant tumors (sarcoma, glioma, etc.) located in the interior of the eye. *Immediate* removal of the eye is imperative.

4. **The Destroyed Eye is Dangerous to the Other Eye.**—Any eye which is capable of bringing on *sympathetic ophthalmia* and thus causing

loss of the other eye should be removed completely and *in time* if it has irrevocably lost all visual power. When one eye, partly atrophied, remains red, inflamed and tender on digital pressure in spite of all treatment, or contains unremovable foreign bodies or is the seat of incurable lesions, abstinence is no longer in order, but removal of the eye should be proposed.

Such removal, constituting a species of refined disarticulation, with section of the muscles and nerves level with the eye, and *very careful* preservation of the conjunctiva and all the components of a *stump*, which is then sometimes made harder and larger by an internal prosthesis (gold ball, cartilage), can often be carried out under deep local anesthesia. The external prosthesis or shell should not be applied until three weeks after the operation.

The artificial eye is an enamel shell, single or sometimes double-walled, representing exactly the other eye in all external details, inserted and removed without pain, like a denture, with the precautions specified by its maker.

Needless to state, one should never use ready-made eyes, indiscriminately purchased.

The patients themselves, under such circumstances, always select eyes that are *too large* and that wound and distort the lids, which they immobilize. Such eyes gradually induce inflammation of the conjunctival cavity, which, discharging, infected and shrunken, becomes unable to tolerate the prosthesis.

At least *once a year* even the best-made artificial eye should be changed, gradually becoming dull, rough and irritating.

Proper prosthesis is of immense individual and social benefit. It is absolutely necessary to recommend prosthesis *in good time* to those persons who shrink from the thought of wearing an artificial eye, as the conjunctival sac will otherwise become reduced and it will be too late to obtain a good result.

VII.—TREATMENT BEFORE AND AFTER AN OPHTHALMIC DISEASE.

In the foregoing pages a summary discussion has been presented of the actual morbid condition, functional or organic in nature, which has led the patient to seek the advice of the general practitioner or the ophthalmologist.

Ophthalmic therapeutics, however, does not cease there, and it must likewise be preceded by other measures.

FOR THE BLIND.—Where the most enlightened procedures have been blocked, first of all, by a complete or almost complete destruction of the eye; where they have followed to the ultimate end, without mastering it, an inexorable disorder such as atrophy of the optic nerve in tabes—to mention only the most disappointing example of all, since nothing so far has made it possible to save the *fellow* eye—it still remains the practitioner's duty to keep up, and especially to build up, courage in the blinded individual. The latter, in turn, must fight against despair and retain a taste for independent life rather than become, as a physical and mental wreck, the passive dependent or victim of more or less well-intentioned associates.

Even in the most incurable disorder, the physician should be reserved in his prognostic expressions and therapeutic acts. Far from falling into suspicious quackery or, on the other hand, into paralyzing nihilism, he should, by steering between these two extremes when conversing with the blind subject, instil hopes of new favorable happenings from which he may benefit; he should cultivate in him all that seems worthy of such attention and in all ways gradually unfold before him new conditions of general hygiene and occupation.

The patient should be directed to those persons who have dedicated their lives to bettering the fate of the blind. All instructions will be given to him by them for "living the sightless life," for becoming occupied and making himself useful to others as well as himself, and for leading such a life as will keep up all functions except that which no measures have been successful in saving. An intelligent and well guided blind person is capable of accomplishing extraordinary things and is proud of them. It is the part of humanity to supply him with the means for such accomplishments, and nothing that relates to such humanity can be foreign to the interest of the physician, even after his hopes in the case have been defeated.

PROPHYLACTIC TREATMENT OF EYE AFFECTIONS.—Aside from the victims, however, there is the multitude of those whose eyes have never been threatened. These persons must be defended at all ages and in all circumstances against the risks of a *wound*, an *infection*, *exaggerated use* of the eyes and an *ocular localization* dependent upon a *general disturbance*, sometimes acquired, but too often inherited—these different factors, indeed, being frequently coexistent.

Let us summarize ophthalmologic prophylaxis in accordance with age and the conditions of life.

I. In the Newborn.—The eyes of the newborn child are always threatened with infection from the discharges of the mother.

How shall they be protected?

As soon as possible, the eyelids should be lightly washed with soap or with alkaline boiled water (2 or 3 pinches of sodium bicarbonate in a bowl of warm boiled water); then, with another pledget, a little of this solution, *prepared separately in another container*, should be allowed to run in between the lids; a third pledget is used for wiping.

An antiseptic instillation should then be made.

Credé's method (instillation of 2 per cent. silver nitrate solution) has proven its value; but this solution is too strong and caustic, and a 1 per cent. solution is sufficient, two drops being placed in each eye. It is unnecessary to wash it off with salt solution.

For a day or two there is a *slight* reaction with mucous secretion.

An instillation of 20 per cent. argyrol also seems to possess great preventive utility. Lemon juice, potassium permanganate and iodoform are less reliable. Irrigations of mercury bichloride solution have been known to produce *permanent* corneal opacities.

The prophylactic instillation of 1 per cent. silver nitrate or of 20 per cent. argyrol should be made *in all newborn children*, regardless of the condition of the mother. I do not understand how a few obstetricians and ophthalmologists are able to maintain that this procedure should be reserved for children born of a mother in whom inquiry or examination shows or leads to a suspicion (!) of specific infection, nor why they do not come to an agreement as to the solution to be used, 1 per cent. being effective and devoid of risk.

For the first few days of life, sources of infection in the *hands, receptacles, cotton pledgets* and towels should be watched; *sponges* should be banished.

If, in spite of all, on the third day after birth the eyes are secreting, swollen and red, PURULENT OPHTHALMIA HAS SET IN and calls for the appropriate treatment immediately.

Prophylaxis as regards the transmission of this disorder to other persons consists merely in the burning of contaminated objects and washing soiled hands with soap, as the disease is transmitted only by contact. Disinfection of the premises is not indicated.

II. In the Child and Adolescent.—AT BIRTH, the conditions to be feared are *purulent ophthalmia* and *injuries by forceps*. Later, IN CHILDHOOD and up to adolescence:

Injuries (dangerous toys, etc.).

Scrofulous ophthalmia (phlyctenular conjunctivitis and keratitis), the usual cause of corneal opacities—an important danger to society.

Inherited syphilis of the eye.

Pseudomembranous forms of conjunctivitis.

Protracted forms of conjunctivitis (follicular, granulo-trachomatous, etc.), and *school* infections.

Strabismus.

The development of myopia of *high degree*. In this connection the special injunctions for myopes should be recollected: The eyes should be held at a distance of *about* 33 centimeters (13 inches) from the work, which should be well illuminated, with light coming from the left or from behind; fine, prolonged and night work should be limited; reading in bed is to be interdicted; the work should be on an inclined plane; the writing should be large and vertical; the patient should submit to a periodic examination and reconsideration of the eyes, vision and correcting glasses.

Any child who claims he does not see well should have his eyes examined as soon as he is able to recognize the capital letters. This will suffice for ophthalmologic supervision, the selection of glasses and formulation of the hygienic precautions required. In addition, it will already be possible to detect congenital intraocular diseases which do not show outwardly but are rendered probable by visual weakness.

III. In the Adult.—The physician should urge that the eyes be washed morning and evening with warm boiled water and a clean towel, or with boiled tampons, after the hands have been washed with soap.

The practice of opening the eyes in a common bowl fill with cold water of dubious cleanness should be warned against.

The practice of sleeping with the windows open causes conjunctivitis only if there are draughts and sudden chilling occurs.

The details of hygienic *illumination* cannot be given here. Complete and precise instructions can, indeed, as in the case of *tinted glasses*, be given only by the ophthalmologist. The same is true of all that concerns *sports* (hunting, boxing, automobiling, etc.) and traumatizing and unwholesome *occupations*.

Further, there is the whole subject of demographic and social hygiene of the healthy and diseased eye, which cannot be discussed here, even along general lines. It may be noted, however, that in *emigrants* there is required not only an examination of the eye and its adnexa from the objective and functional standpoints, but also a *complete* eversion of the *upper* lid to reveal the presence of *granular conjunctivitis*, a dangerous source of contagion. The majority of other diseases of the eye, except leprosy, would not seem to deserve exclusion, but merely a postponement of the undesirables.

The foregoing presentation, necessarily a limited one, has dealt only with the commoner diseases of the eye. "The rare diseases are

little more than curiosities; but this is far from being the case with the everyday diseases, those which the physician meets at every step in the practice of his art, those with which he must be familiar and which he must know how to treat." (Chomel.)

To treat these diseases well, if not to know them well, the practising physician must constantly, in the interests of his patients as well as his own, make his decision, positive or negative, *in good time, as though he were himself the patient*. He will then be rendering service, and cannot do harm if he acts with due caution, conscientiousness and humanitarian purpose.

INSTRUCTIONS TO THE PATIENT.

The recognized and practical justification of every visit to or by the physician is the formulation of instructions to the patient.

Such a series of instructions constitutes, indeed, the written outline in which are condensed in a lucid, circumstantial way the rules of treatment drawn up by the physician in consequence of the diagnosis he has just made and the therapeutic procedures he proposes to apply. Accordingly, it should be written—after a short period of synthetic meditation and co-ordinated mental debate—in a relatively quiet room, with exclusion in all possible degree of intrusive hubbub and disturbing excitement. These are, indeed, often difficult conditions to secure.

In a general way, the outline of instructions should comprise three divisions:

1. Medicinal instructions.
2. Dietetic instructions.
3. Hygienic and physiotherapeutic instructions.

For proper understanding and execution it is well that these three kinds of instructions be divided into three distinct sections or paragraphs, or even, as will be described later, written on three separate sheets.

I.—MEDICINAL INSTRUCTIONS.

These should take into account collectively the requirements of the patient, the druggist and the persons called upon to carry out the directions given.

Accordingly, they comprise: The medicinal prescription proper, the instructions to the pharmacist relative to the proper filling of the prescription, and those directed to the nurses to insure proper administration of the remedies ordered.

PRESCRIPTIONS.—The remedies prescribed may be classified for practical purposes into three varieties: Extemporaneous, official and proprietary. Only the first two will be discussed here, the third type, which may range in quality from very good to extremely bad, being left to the judgment of the practitioner.

1. **Extemporaneous Preparations.**—Originally devised or conceived by the practitioner or borrowed by him from a colleague, these prepar-

(1829)

tions constitute drug mixtures and combinations which are to be prepared according to the practitioner's directions by the pharmacist.

Each prescription should be written with a separate indent, numbered and clearly separated from the next one by a line.

The drug combination may be of a varying degree of complexity, but in it are generally included:

1. *One or more active substances*, the therapeutic effects of which are desired in the particular case (mercury in syphilis, sodium salicylate in rheumatism, quinine in malaria, colchicum in a gouty attack, etc.).

2. *Auxiliary substances* intended either to strengthen the action of the principal agent or agents (*adjuvants*: arsenic combined with mercury, antipyrin combined with sodium salicylate, acetylsalicylic acid combined with colchicum, etc.), or to attenuate its harmful or unpleasant effects (*correctives*: opium to counteract diarrhea due to mercury, sodium bicarbonate to counteract the unfavorable action of sodium salicylate on the gastric mucous membrane, etc.).

3. *Substances (excipients) practically inactive* from the pharmacodynamic standpoint, but very important from the pharmaceutical standpoint in that they impart to the foregoing substances the consistency, cohesion, homogeneity and solubility required for their regular, easy and pleasant administration.

Let it be supposed, for example, that a prescription for pills for anemia is required. *Arsenic* and *iron* are selected as the *active substances*; if the constipating effect of iron is feared, *correctives* may be added consisting of a laxative, such as rhubarb, as well as oil of anise, to counteract the possible cramps. *Honey* and *powdered licorice* will afford good excipients intended, on the one hand, to divide the medicinal mass in a homogeneous manner and, on the other hand, to impart to it the consistency, cohesion and softness sufficient for the proper preparation of pills and for their proper absorption.

The amounts of the various ingredients may be expressed in the metric units (grams or cubic centimeters) [or in the apothecaries' weights and measures] or, occasionally, in drops.

The amount of the excipient, which is immaterial from the pharmacodynamic standpoint, is usually best left to the judgment of the pharmacist. It relates merely to the proper preparation, keeping qualities and good appearance of the product. This intention is customarily expressed in the letters *q.s.* (*quantum satis* or *sufficit*), the added meaning "for the proper execution of the prescription" being understood.

Where two ingredients are contained in a prescription in equal amounts, the expression *aa* (*ana*) may be used.

The dose in drops, if employed, may be preceded by the abbreviation *gtt.*

The combination of ingredients above referred to may, accordingly be written as follows:

R Arseni trioxidi	0.002	gram (gr. $\frac{1}{32}$);
Ferri protoxalatis,		
Rhei pulveris	0.05	gram (gr. $\frac{3}{4}$);
Olei anisi		gtt. j;
Glycyrrhizæ pulveris	0.1	gram (gr. iss);
Mellis		q. s.

Additional Directions to the Pharmacist.—The formula proper having been written, it is necessary to supplement it with directions to the pharmacist as to the *modus faciendi*:

1. Mention of the desired form of pharmaceutic preparation.
2. The amount to be supplied to the patient.
3. All instructions deemed serviceable for the proper filling of the prescription.

The pharmacist should thus be told whether the preparation is to be in pills, capsules, suppositories, for enemas, etc., and how many units of each of such articles he is to supply.

In this connection, there are two available procedures in writing the prescription. The first is to state the total amount of each of the ingredients in the formula; the second, to formulate the composition of each individual pharmaceutic unit.

In the first instance, *e.g.*, the entire amount of each ingredient required to make 30 pills would be put down and the directions given below, "Divide in pil. No. xxx." In the second instance, the corresponding directions would be: "Ft. pil. No. i. Da tal. No. xxx."

Additional instructions may be given, such as stating whether the pills are to be soft, or silver-coated, or enteric-coated, or should be kept dry, etc. If a completely original formula is being used, the entire *modus faciendi* may be described.

Some of the abbreviations in current use in prescriptions will be given later.

Directions to the Patient.—These should include mention of the mode of introduction or application (mixture to be taken by the mouth, hypodermic injection, enema, inunction, etc.), the number and amount of the doses (or of the applications) in twenty-four hours (1, 2 or 3 teaspoonfuls, tablespoonfuls, etc.), the time when they are to be taken (on awakening, on retiring, before, after or with the meals), the appropriate vehicle, if any be indicated (plain water, Vichy water, milk, a decoction, etc.), the duration of the treatment (days or months), together with any information deemed necessary.

to warn the patient concerning possible unpleasant accompaniments or to prevent some idiosyncratic manifestation (care of the mouth during mercurial treatment, interruption of such treatment in the event of diarrhea, reduction of iodide ingestion in the event of coryza, etc.).

Thus, to the prescription formulated above should be added, *e.g.*:

Sig.: To be taken in a little water three times a day in the middle of the meals.

2. Official Preparations.—The official preparations are, in general, preparations that have been extemporaneous at some previous time but have been made "official" by reason of prolonged successful experience in their use. They are recognized in the Pharmacopœia and their preparation must, therefore, be carried out in strict conformity with the definite and precise directions given therein. They are required to be ready prepared and kept in stock in all apothecary shops.

Prescription of the official combined preparations is a much simpler matter than that of preparations of the preceding variety, since the mere mention of their name implies a ready-made combination of definite composition. Thus:

Pulvis ipecacuanhæ et opii (U. S. P.; Dover's powder):

Ipecacuanhæ,	
Opii pulverati	āā 10 grams (ʒiiss);
Lactosi	80 grams (ʒiiss).

[The same considerations apply to the "semi-official" preparations of the National Formulary. Thus:

Tinctura opii crocata (N. F.; Sydenham's laudanum):

Opii granulati	10 grams (ʒiiss);
Crocī	2.5 grams (gr. xxxviiss);
Cinnamomi,	
Caryophylli	āā 0.6 gram (gr. x);
Alcoholis diluti	q. s. ad 100 c.c. (ʒiiss).]

Mention is to be made, therefore, of: 1. The official preparation desired. 2. The amount, as already stated. 3. The directions to the patient.

The official [and semi-official] preparations may also form part of more complex combinations.

Thus:

℞ Pulveris ipecacuanhæ et opii,	
Quininæ dihydrochloridi,	
Sodii benzoatis,	
Terpini hydratis	āā 0.05 gram (gr. ¼);
Mellis	q. s.

Ft. pil. No. i.

R. Tincturæ opii crocatæ (N.F.)	10	c.c. (f3iiss);
Chloroformi	1.33	c.c. (mxxiiss);
Olei hyoscyami compositi (N.F.)	40	c.c. (f3x).
M. Sig.: For external use.		

* * *

Where the treatment comprises several prescriptions directed against different symptoms, these should be written in successive paragraphs, lending themselves to precisely the same considerations as have already been presented.

Where the treatment is to include successive periods of medication with different drugs, *e.g.*, arsenicals, mercury and iodides in syphilis, due differentiation should be made by division into clearly distinct sections. Thus:

"For three months: . . ."

"From the 1st to the 10th of each month, take . . .

"From the 11th to the 20th of each month, take . . .

"From the 21st to the 30th of each month, take . . ."

In short, the therapeutic indications having been settled by virtue of a diagnosis as complete as possible, the practitioner will endeavor to meet them as best he can by well-chosen appropriate measures, combine these measures in the simplest and most effective manner, and describe them in the form of a list of instructions as concise, lucid and complete as possible, in conformity with the customary practices.

Such a list of instructions constitutes a kind of work of art and mirror through which are expressed and reflected, in the last analysis, the knowledge, ingenuity, originality, devotion and character of the practitioner.

II.—DIETETIC INSTRUCTIONS.

These are, in the majority of instances, much more important than the medicinal prescriptions. Indeed, a majority of the disorders we are called upon to treat do not call for the use of any drug; none, on the other hand, can fail to benefit from a rational diet.

For a more detailed consideration of this subject the reader is referred to the separate section on dietetics and the dietary particulars mentioned under the various diseases. The preparation of the dietetic portion of the physician's outline of instructions calls, however, for certain practical recommendations at this point.

The régime outlined should, insofar as is feasible, specify the *nature* of the ingesta allowed or forbidden (solids and liquids); their approximate

or exact amount (solids and liquids); the number, time interval, and composition of the meals (solids and liquids), and various directions regarding the preparation of the foods, their seasoning, mastication, the teeth, exercise or rest after meals, etc., and any other factors capable of assisting the digestive functions.

Such an outline, even if concisely written, is always rather long and entails the loss of much valuable time. Accordingly, one cannot too strongly recommend to the practitioner to be provided with printed diet lists, prepared with due reflection, and relating to the commonest clinical conditions met with. These may be corrected, improved and completed in handwriting, that they may be better adapted to the individual case. A number of these general diet lists will be found presented in the section on *Dietetics*.

Objection has been made to such printed diet lists on the ground that they are not well received by the patients, who regard them as constituting "ready made" treatment and would prefer a "made to measure" diet list. That such is the case has not, however, been my personal experience. As a matter of fact, only a few strokes of the pen are required to adapt the "omnibus" diet list to the individual patient. Nothing, it would seem, can prevail against the consideration that twenty or thirty minutes' time is required for the writing of such a diet list by hand, whereas only a few seconds are consumed in adapting it to the case as already mentioned.

Only one of these standard diet lists, by way of illustration, need be given here.

Following, for example, is the one which, after modifications for individual purposes, I hand to patients suffering from ordinary dyspepsia with hepatic disturbance:

Articles Allowed:

Lean or milk soups.
Red meats (beef, mutton) or white meats (veal, fowl) or gelatinous meats (calves' head or foot, lamb's feet), well done, in moderate amount—at most 200 grams.
Lean ham, smoked tongue.
Boiled lean fish (sole, whiting, etc.).
Fowl, except duck and goose.
Fresh vegetables (peas, string beans, carrots, asparagus, artichokes, cooked salads, leafy vegetables).
Potatoes.
Macaroni, etc.; cereals.
Thoroughly ripe sweet fruits.
Bread (in restricted amount).
Milk, preferably skimmed, and milk preparations; fresh cheese.
Beverages: Water, decoctions.

Avoid Especially:

Fats and fat meats (pork, goose, salmon, mackerel, eels, sauces, ragoûts, fried articles, etc.).
Acids (vinegar); insufficiently ripe fruits; sorrel, cruciferous plants, cabbage, turnips, radishes, etc.
Spices, gamey, pickled, salted or canned meats.
Indigestible foods, shellfish, onions, raw foods, mushrooms and truffles.
Viscera, kidneys, sweetbreads, calves' liver.
Alcoholic beverages, chocolate.
Eggs and brains.

Culinary Remarks:

Meats. Fowl.—Broiled or roasted without sauce, well done.

Fish.—Boiled, with fresh butter and lemon juice added just before serving.

Vegetables.—Boiled, with fresh butter and lemon juice added just before serving.

Fruits.—Cooked with very little sugar, or raw if thoroughly ripe.

Thick Soups.—Strained purée of vegetables or with milk.

TYPICAL MENU:

Breakfast:

Coffee with milk, sweetened with honey, and crackers on toast. 6.30 P.M.

Noon Meal:

- (a) One chop.
- (b) One helping of potatoes.
- (c) One fresh vegetable.
- (d) One thoroughly ripe fruit.
- (e) Stale bread.
- (f) One glassful of water or hot decoction.

Evening Meal:

- (a) Lean soup.
- (b) Fish or a little fowl.
- (c) Fresh vegetable.
- (d) Fresh cheese.
- (e) Bread.
- (f) Fluid, as at noon meal.

9 or 10 P.M. A cup of some hot decoction; if need be, during the night, a large cupful of hot milk with sugar and with or without addition of water.

General and Special Remarks:

Eat slowly and quietly at regular hours. Masticate thoroughly. Cut the meat up in small pieces and crush the vegetables.

In making home visits, the instructions as to diet may be condensed into a few concise directions.

Thus, the *restricted milk diet* which is very useful at the beginning of the treatment of cardiorenal disorders that have reached the stage of decompensation may be formulated as follows:

Take in the twenty-four hours 800 cubic centimeters (to 1 liter) of skimmed milk in four portions of 200 (to 250) cubic centimeters each at regular intervals: 8 a.m., noon, 4 and 8 p.m. It may be taken hot or cold, with or without sugar, and flavored, if desired, with a *very little* tea, coffee or chocolate. It should be taken slowly, by teaspoonfuls. Rinse out the mouth with Vichy water after each portion.

III.—HYGIENIC AND PHYSIOTHERAPEUTIC INSTRUCTIONS.

Here, likewise, certain directions relating particularly to fresh air, exercise and ordinary hydrotherapy are quite essential. The most important recommendations may, as in the case of the diet, be made on sheets prepared beforehand and then adjusted to the individual case.

A sheet which I regularly employ is reproduced herewith:

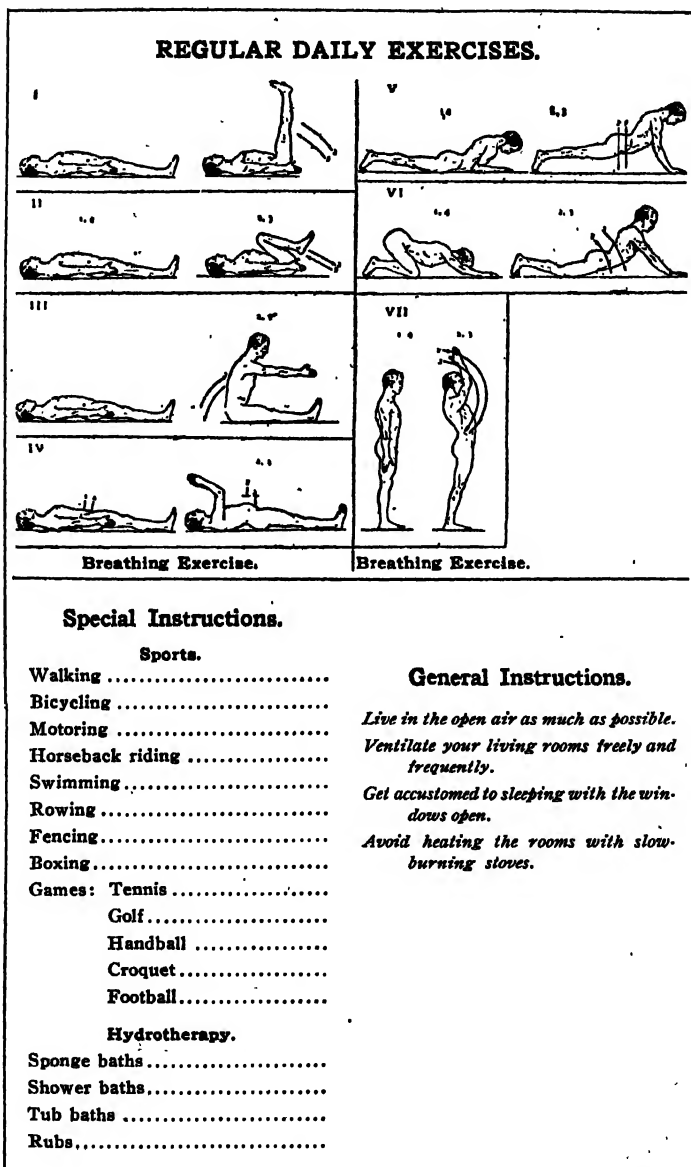


Fig. 369.—Reproduction of a sheet of hygienic and physiotherapeutic instructions.

Obviously, many other recommendations may and should be made—either by word of mouth or in writing—and among those not

to be neglected are such as relate to the procedures of feminine toilet, injections, travelling, vacations, mineral springs, sexual hygiene in its broadest sense, etc.

* * *

In conclusion, a few points relative to everyday practice may be recalled:

The patient should always be given *written* directions, even if they concern merely the diet and general hygiene. Patients show a marked tendency to regard purely oral recommendations as an indication of carelessness and indifference.

Suitable paper should be selected for the purpose—paper correct as to quality, dimensions and general appearance—as far removed from the pretentious, scented paper of the dandy as from the crumpled scrap of paper of the blunderhead. The personality of the physician reveals itself in the most trifling details to the alert observer, and patients have a singular keenness in this connection.

Whenever possible the instructions should be written on paper on which are printed the physician's address and telephone number. This avoids wrong instructions, recalls the physician's address to the patient, and facilitates the work of the pharmacist insofar as he is concerned with the identity of the prescriber.

Endeavor to write plainly. The need of this is too obvious to require emphasis. Let it be merely suggested here that a clear and harmonious handwriting is an indication of a lucid and stable mentality and that, on the other hand, it is an excellent exercise of mental mastery to force one's self to write deliberately and legibly when one is "enervated" and "on edge." It is well always to try to retain mastery over one's inner "animal" self.

The physician must not forget to date and sign the prescription—once again let it be said, in a legible manner.

A duplicate or at least a summary of the instructions given should be kept. This is indispensable in the course of observation which every patient should undergo, and upon the sheet should be recorded, in addition to the name, address, clinical features and treatment followed, all notations of whatever nature relating to the particular case.

The list of directions having been written, dated and signed, it should be read over to the patient out loud, word for word, with addition of all necessary oral comments. This is the best way: 1. To avoid imitating those serious instances of *lapsus calami* of which so many examples are given in the literature on medical jurisprudence. 2. To be under-

stood by the patient both as to the letter of the instructions and their spirit, the latter being frequently the more important of the two. These oral comments very often mark the decisive stage, in which the physician's hold on the patient is extended. Either the patient will have become convinced that he has been understood and treated on the basis of such understanding, in which case the battle is already more than half won, or, on the contrary, he will be left anxious, skeptical and mistrustful, and the battle is already more than half lost.

The physician should not be loathe to hear the objections that may be raised by the patient in relation to similar treatments previously tried without success, inability to take one of the drugs prescribed, or even morbid manifestations induced by such a drug. It will be necessary for the physician to distinguish, without preconceived ideas or false pride, between what should be retained and what should be discarded from among these observations, and he should always explain to the patient the reasons for their occurrence.

* * *

ABBREVIATIONS IN COMMON USE IN PRESCRIPTIONS.

<i>āā, ana</i>		Of each.
<i>Ad.</i>	<i>Adde</i>	Add (thou).
<i>Ad. lib.</i>	<i>Ad libitum</i>	At pleasure.
<i>Aq.</i>	<i>Aqua</i>	Water.
<i>Aq. bull.</i>	<i>Aqua bulliens</i>	Boiling water.
<i>Aq. comm.</i>	<i>Aqua communis</i>	Common water.
<i>Aq. dest.</i>	<i>Aqua destillata</i>	Distilled water.
<i>Aq. ferv.</i>	<i>Aqua fervens</i>	Warm water.
<i>Aq. fluv.</i>	<i>Aqua fluvialis</i>	River water.
<i>Aq. font.</i>	<i>Aqua fontis</i>	Spring water.
<i>Aq. pluv.</i>	<i>Aqua pluvialis</i>	Rain water.
<i>B. M.</i>	<i>Balneum Mariæ</i>	Water bath.
<i>Bol.</i>	<i>Bolus</i>	Bolus, large pill.
<i>Bull.</i>	<i>Bulliat</i>	Let it boil.
<i>Chart.</i>	<i>Charta</i>	Paper.
<i>Coch.</i>	<i>Cochleare</i>	Spoonful.
<i>Div.</i>	<i>Divide</i>	Divide.
<i>Elect.</i>	<i>Electuarius</i>	An electuary.
<i>Fit.</i>	<i>Fit, fiat, fiant</i>	Let be made.
<i>F. S. A.</i>	<i>Fac secundum artem</i>	Make (thou) according to the art.
<i>Filt.</i>	<i>Filtra</i>	Filter (thou).
<i>Fl.</i>	<i>Flores</i>	Flowers.
<i>Fol.</i>	<i>Folia</i>	Leaves.
<i>Fruct.</i>	<i>Fructus</i>	Fruit.
<i>Gtt.</i>	<i>Gutta, gutta</i>	A drop, drops.
<i>Jul.</i>	<i>Julepum</i>	Julep.
<i>M.</i>	<i>Misce</i>	Mix.
<i>No.</i>	<i>Numero</i>	In number.
<i>Ol.</i>	<i>Oleum</i>	Oil.

ABBREVIATIONS (continued).

<i>P. e.</i>	<i>Partes æquales</i>	Equal parts.
<i>Pil.</i>	<i>Pilula</i>	Pill.
<i>Pulv.</i>	<i>Pulvis</i>	Powder.
<i>Q. s.</i>	<i>Quantum satis</i>	A sufficient quantity.
<i>Q. l.</i>	<i>Quantum libet</i>	} As much as you please.
<i>Q. p.</i>	<i>Quantum placet</i>	
<i>Q. v.</i>	<i>Quantum volueris</i>	} According to (the rules of) the art.
<i>S. a.</i>	<i>Secundum artem</i>	
<i>Sem.</i>	<i>Semen</i>	Seed.
<i>Sig.</i>	<i>Signa</i>	Write (thou).
<i>Syr.</i>	<i>Syrupus</i>	Syrup.
<i>Tinct., tr.</i>	<i>Tinctura</i>	Tincture.
<i>Ung.</i>	<i>Unguentum</i>	Ointment.

Examples.

℞ Uvæ ursi 10 grams (5iiss);
 Aquæ bullientis 300 c.c. (f3x).
 Fac infusum et adde:
 Sodii salicylatis 5 grams (gr. lxxv);
 Acaciæ pulveris 4 grams (3j).

F. s. a.
 Sig.: One tablespoonful every two hours.

℞ Pulveris ipecacuanhæ et opii 1 gram (gr. xv);
 Sodii bicarbonatis 2 grams (gr. xxx);
 Lactosi 20 grams (3v).

M. et div. in chart. No. xx.
 Sig.: Four powders a day.

℞ Arseni trioxidi 0.06 gram (gr. j);
 Ferri lactatis 6 grams (3iiss).

Fac pulv. et adde syrupi q. s. M. et ft. pil. No. lx.
 Sig.: Two pills three times a day after meals.

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